EUROPEAN UNIVERSITY INSTITUTE
Department of Political and Social Sciences

Framing the public

Three case studies in public participation in the governance of agricultural biotechnology

By

Janus HANSEN

Thesis submitted for assessment with
A view to obtaining the Degree of Doctor of the
European University Institute

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It goes (almost) without saying that any errors, inconsistencies or omissions that might be found in the following pages are my sole responsibility.

Florence, May 2005

Janus Hansen

Abstract

The thesis explores how public controversies over agricultural biotechnology have been sought to be mitigated through procedures of public involvement in policy making in three different European countries (Denmark, the UK, and Germany).

The thesis surveys social research on the reasons for public discontent over GM food, and identifies and discusses a certain set of ideas on how to deal with technological controversies, summarised under the heading of public participation and inclusion. It is argued that the ideals of public participation are increasingly propagated as a means to mediate in risk controversies.

With inspiration from autopoietic systems theory and Cultural Theory, the social structural roots of controversies about technologies considered to be risky are identified and theoretically analysed. The controversies are argued to be rooted in tensions in functionally differentiated modern societies, between dependency on expert knowledge, which is by nature socially and thematically exclusionary, and ideals about socially and thematically inclusionary democratic forms of governance.

On this background three (functionally equivalent but institutionally diverse) procedures that aimed to bridge such tensions by means of public involvement are compared in order to investigate how 'the public' is operationalised in participatory procedures, and what effects different operationalisations have on the outcomes of the procedures.

The three cases analysed are a Danish 'consensus conference' and the work of an ethics committee, a large-scale public debate experiment in Britain called 'GM Nation?' and a German corporatist, round-table dialogue called 'Diskurs Grüne Gentechnik'.

The three cases are compared with regard to how they seek 1) to achieve resonance in their respective socio-political environments, 2) to regulate principles of inclusion in and exclusion from the procedures and 3) to establish scientific competence in their outputs.

The thesis concludes that although the procedures investigated concern the same material topic, can be considered sociologically equivalent in regard to the functions they seek to fulfil, and to a considerable degree draw inspiration from similar intellectual sources, their actual institutional embodiments vary significantly as do their effects. This variation is ascribed in part to the location of the procedures in different political cultures, but also to significant contingencies pertaining to more idiosyncratic complexities in the individual cases.

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Introduction

Over the past 30 years or so, the world has witnessed a number of scientific discoveries and technological innovations in biology, biotechnology and genetically based medicine which, it would appear, could substantially alter both food production and healthcare in technical as well as social terms. For those promoting these various technologies, the developments hold the potential for a better world, whilst for the sceptics they hold Faustian dangers. These diverging evaluations of 'the same' technologies have provided the material for an apparently endless social controversy.[1] One should of course be careful when making such sweeping statements, but it seems justified to say that in both food production and medicine scientific progress and technological innovation is no longer unambiguously equated with social progress.

Parallel to, and in part as a consequence of, controversies over a number of science-based technologies and their ecological and social impacts, a changed configuration of interaction between what may in a short formula be termed 'science and society' can be observed. In short, the social prestige of science has declined, as has the possibility for science as an institution to effectively abdicate responsibility for the technological application of new knowledge. Consequently a withdrawal or decline of public trust in expert institutions is often diagnosed. In this thesis these observed developments will be explored as the product of a principled tension between, on the one hand, the dependency of modern societies in a wide range of areas on scientific knowledge and science-based expertise (which by nature is highly *exclusionary* both thematically and socially) and, on the other hand, the normative expectation that collective choices should be a matter for democratic procedures and deliberations (which are meant to be broadly *inclusionary* thematically as well as socially).

The thesis starts from the assumption that these developments and controversies, some of which will be conceptually clarified and empirically fleshed out in the work, pose several interesting sociological puzzles. As such, biotechnology provides an interesting focus for studying the interaction between science, technology and democracy, as well as the tension (certain) technological developments create in social relations. This thesis sets out to explore some of these issues.

More specifically, I take two observations as my starting points. The first is that reflections on how to manage social controversies sparked by technological dynamics in ways that are both competent and legitimate have fostered a series of claims – a particular discourse, or semantic – that controversies can (and preferably should) be mitigated through participative and deliberative procedures, which some observers claim could potentially render

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[1] I put 'the same' in quotation marks to indicate from the outset that a central assumption underpinning the thesis is that substantial parts of the controversies consist in defining and delimiting what the technologies and their effects actually *are*, and contestants therefore cannot necessarily be assumed to observe and debate 'the same' thing.

technological choices more democratically accountable and socially competent. In short, such procedures are claimed to produce legitimacy. The second observation is that these participatory and deliberative discourses have – in different contexts – initiated, facilitated or developed in symbiosis with a differentiation of specialized modes of communication and the formation of organisational forums aimed at mitigating technological controversies in which 'public involvement' in one form or another constitutes an important mode of operation and figures prominently in self-descriptions of the organisations in question. It is these observed developments I wish to explore further.

One technological field where many of the issues I wish to investigate are particularly pronounced is the agricultural application of modern biotechnology.[2] Here one can observe a communicative intermingling of cognitive, socio-economic and moral elements, which, on the one hand, make the issues extremely intricate and opaque and, on the other hand, tend to polarise them. In particular, this appears to entail confrontation between a dominant fraction of scientific experts and economic operators, who are predominantly positive towards the new technologies and a majority of the populations (and social movement organisations), at least in Western Europe, who are predominantly negative. Therefore, I have chosen the social management of genetically modified organisms (GMOs) as the empirical field of investigation. However, I will argue that a number of the social mechanisms to be discussed in the thesis are equally applicable to other technological fields and that, ideally, their exploration can contribute to a more general sociological understanding of the nature and dynamics of modern societies. The study of technological controversies therefore invites a consideration of the fundamental structures of modern societies, just as such controversies can only be rendered fully comprehensible via an analysis that takes these structures into consideration. Therefore, I will seek to link these the specific inquiries to more general discussions in sociological theory.

The kind of controversies I investigate are, as indicated above, characterised by a combination of cognitive uncertainties regarding the physical properties of the technologies in question, uncertainties regarding their socio-economic impacts and what for lack of a better term can be called moral uncertainties, i.e. a lack of commonly shared normative evaluatory yard-sticks underpinning collective decision making. This means that in such controversies a number of perspectives confront one another both in and outside of the public sphere. It is the dynamics of these clashes, which are of interest here. A further result of this is a change in the demands on politics and political institutions as general addressees of problems that cannot be solved or settled elsewhere in modern societies. Just as the social prestige and internal workings of science are put under pressure by such controversies, so are political institutions. One general thrust of this development has been an increase in de-

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[2] By modern biotechnology I mean, following Bauer and Gaskell, '... processes, products and services that have been developed on the basis of interventions at the level of the gene' (Bauer and Gaskell 2002a: 3).

mands for 'more democracy', for more participation, deliberation, dialogue and inclusion in the politics of science and technology. This is perhaps particularly pronounced on the theoretical and rhetorical levels, but there are also empirical indications of a certain evolution in the interaction between politics, science and 'the public', which can be described as the establishment of contexts where different modes of communication pertaining to technology are confronted with each other in ways that involve the participation of a greater number and scope of actors than have usually been included in science and technology policy making.

The demands for increased participation and deliberation have found a certain resonance in the social sciences, where they are increasingly discussed in normative, theoretical and empirical terms – sometimes, however, in a manner which makes it difficult to distinguish between analysis and advocacy.[3] It is my perception that such discourses – I will provisionally call them participatory or deliberative postulates – have received significant (and increasing) attention in theoretical terms, but less work has investigated the empirical effects of these postulates. A central ambition of the thesis will therefore be to suggest a sociological approach to the study of actual processes of 'public involvement' with regard to technological controversies – their thematic and social composition, their internal dynamics and their effects on the governance of technologies.[4] A more long-term ambition is to contribute to a sociologically qualified discussion of what the most important social factors are for deliberation, that is which conditions optimise the chance that the normative claims entailed in the advocacy for more participation and deliberation can actually be redeemed.

In order to pursue these aims the investigation will consist of three central components: 1) An attempt to spell out the essence of the participatory/deliberative postulates entering into processes of public involvement in technological controversies as a particular mode of communication. 2) The development of a sociological-theoretical perspective that take a certain distance from these postulates, and which can inform and direct the empirical investigations of such procedures (i.e. without being biased towards the participatory ideals). 3) A detailed empirical study and comparison of a number of such processes, in order to explore the diversity of ways in which the participatory/deliberative modes of communication are 'operationalised' and what effects they actually have in their respective policy contexts.

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[3] The discourses on participation and deliberation have of course been around for a long time, but it is not until more recently they have gained prominence in regard to science and technology, which has traditionally been considered the exclusive domain of experts.

[4] When I say a *sociological* approach, this entails a claim that the system reference of the investigation must be society as such, and not just the political processes allegedly central to these controversies, nor the effects on individual concerns and anxieties. This means that an adequate interpretation of the controversies must seek to locate them in the structural context of modern societies.

The Research Problem

The topic to be explored more specifically is *how* 'the public' is actually brought into being communicatively, what assumptions and confrontations go into what can be termed the 'operationalisation' of the public and public concerns – and what effects this has for the dynamics and effects of such procedures. The research question guiding the thesis can thus be formulated as:

How are public involvement events organised to effect on the communicative dynamic in GM biotechnology policy arenas?

More specifically, how do conceptions of 'the public', their concerns and their role in policy-making mediate the effects of public controversy on policy formation in this area?

The underlying assumption here is that in various procedures of public involvement, assumptions are made and discursive framings are propagated about:

- (the nature of) 'the public'
- the issues at stake in the controversies
- the distribution of competences among different actors in the policy arenas
- which inputs into policy-making from 'the public' are relevant (or legitimate)

and that the configuration of these framings differs in various embodiments of mediating procedures. An aim will therefore be to investigate how these dimensions are configured in specific cases and what challenges different configurations pose for the use of procedures of public involvement in actual policy-making processes.

The empirical part of the study consists of three case studies and their comparison. This shall serve to explicate similarities and differences in how the public has been operationalised in different settings and what effects these operationalisations have had. In combination with theoretical analysis this scrutiny of specific processes will hopefully provide an increased understanding of the possibilities and limitations in participatory and deliberative forms of policy making in the science and technology domain.

Before launching into this empirical analysis I draw from existing research and theoretical discussions:

- an understanding of the structural features of public concerns over biotechnology and the dynamic of the controversies in the field, as well as an outline of the regulatory issues involved in the social management of agricultural biotechnology,

- central elements of the perceived need for increased participation and deliberation in technology assessment as well as the normative principles enbedded in these calls, and
- a general theoretical framework for interpreting and analysing the dynamics of controversies about science and technology in modern societies with a particular emphasis on risks.

Arguably, contemporary calls for more participation and deliberation in science and technology policy-making are part of a transnational trend. This observation applies independently of whether they are considered as part of a discourse on 'the democratisation of democracy' (Giddens) or more instrumentally as a means to manage social controversy. As will be shown, there are certainly recurring discursive elements across the cases to be discussed. This indicates a significant mutual observation between the organisations carrying out science and technology policy making (and between their 'accompanying' academic observers) in different national contexts as well as an emerging interest among supranational organisations, notably the EU, in such processes. However, most of the practical experiences (and experiments) with these new modes of policy-making are clearly embedded in national, if not sub-national, contexts. Therefore, the cases investigated here are located in and address national political institutions.

The three cases selected for examination are the following: 1) A Danish consensus conference, the central trait of which is the assessments of a panel of lay people deliberating with a panel of experts, as well as an initiative to instigate political and public debate about ethical principles guiding the regulation of biotechnology. 2) A large-scale British public debate arrangement combined with scientific and economic inquires performed in a public mode. 3) A German 'round-table dialogue process' among major stakeholders initiated by the German government, which was given a deliberative format and also undertaken as a public event.

The research design is based on two premises. The first is that the procedures selected for analysis can – despite a number of differences – be considered as instances of the same class of social phenomena. They are all specially differentiated forms of communication about a technology considered risky with the aim of mitigating controversy by means of expanded social and thematic inclusion. As such, they are confronted with similar substantive issues and to a large extent draw inspiration for their operationalisation from the same participatory and discursive semantics. However, they exhibit substantial differences in their social, temporal and substantive configurations. Following from this, the second premise is that a theoretical framework must be devised which can at the same time render the cases comparable and allow for the description and analysis of their similarities and differences. To anticipate the investigations a little, the developed framework focuses on the

social, temporal and substantive dimensions of how the procedures operationalise the need to a) communicate the acceptability by 'the public' of various risks to decision makers, b) to establish trust-generating mechanism that will ensure a legitimate delegation of competence from 'the public' to decision-makers and c) to devise mechanisms to mediate perceptual and interpretive differences pertaining to the technology.

The main focus will be on exploring the dynamic of these alternative modes for more inclusive policy advice and formulation, as well as those challenges to the success of the procedures that can be observed – in principle independently of their national contexts.

However, some of the differences between the observed procedures are clearly ascribable to their different national origins. Although the inquiry is not meant to be a cross-national comparison *stricto sensu* [5] these differences must of course be taken into consideration as contextual variables when exploring the cases.

The cases exhibit a significant path-dependency and cannot be adequately assessed in isolation. This has certain consequences for the way the case studies are conducted. Firstly, in order to be able to assess the kind of impacts the procedures might or might not have in the policy arenas, an account of these contexts are necessary. Secondly, the reconstruction of their respective contexts is a task that goes beyond the scope of a single thesis and will need to be based in part on the observations of other scholars.

The cases will be described and analysed individually. Subsequently they will be compared along selected dimensions, pointing out how the cases can be seen as different solutions to common challenges to such procedures. The dimensions of comparison will be derived in part from the case studies themselves, in part from the normative discussions on participation and deliberation. As will be discussed in more detail, the comparative dimensions run under the headings of 'constructing representativeness', 'constructing competence' and 'links to policy making'.

Structure of the thesis

In order to guide the reader through the text, the remainder of this introduction offers a brief, motivated overview of the structure of the thesis.

Chapter I: Approaching the empirical field

The first chapter aims at achieving an initial understanding of the controversial 'landscape' in which the new forms of policy making mean to intervene. This will be pursued through the review of two, partly separate, bodies of literature, which, to put it a little crudely, focus

[5] i.e. accounting for difference in procedural designs and outcomes (only) by means of national political and institutional cultures.

on the 'social' and the 'substantive' dimensions of the societal appropriation of biotechnology.

Of course no one controversy is entirely invariant across time and national context. Nonetheless, the social scientific observations made on this topic have established certain common traits and developed certain ways of observing the nature and dynamic of technological controversies, which I consider a necessary background for understanding the communicative dynamic of the cases to be investigated. The chapter constitutes a review of the most important approaches and the insights gained. I shall attempt, firstly, to identify common features of the social dynamic and structure of the controversies over (especially agricultural) biotechnology, how these have developed historically and how the social scientific observation of technological controversies has 'co-evolved' with diverging assessments between different social groups. Central to this discussion is the 'public perception' paradigm and the criticisms that have followed in its wake. The basic question here is what 'the public' is 'concerned' about, as well as how these concerns are structured and manifested, what their determinants are and how they vary temporally and spatially. Furthermore, I shall introduce into the discussion some reflections on the rationality of such concerns, and the potential functions and effects of popular opposition to technological change.

Secondly, I present a brief introduction to the social regulation of biotechnology. By 'social' regulation I mean that the focus is not on the technicalities of regulation but on the underlying principles and concerns involved as well as its institutional embedding, primarily in Europe. The section will serve to describe the temporal evolvement of regulatory regimes of agricultural biotechnology as a background for the case studies and the context in which the policy making modes to be discussed are situated.

Chapter II: New discourses on science and technology policy

The second chapter looks at the body of literature advocating and analysing new participatory and deliberative forms of science and technology policy-making. I briefly discuss how participatory and deliberative modes of policy making distinguish themselves from more 'traditional' modes. I then go on to tease out the normative, analytical and empirical elements in the discourses on participatory and deliberative approaches to the management of risky technologies in a general mode. Although the writings to be discussed are arguably part of a shared discursive trend, they are in my opinion best understood as a conglomerate of discourses, which intermingle in the discussions. I will present this view with reference to particular writers often quoted in the social scientific debates on these issues. Here I see three different nuances, which seem worth discussing separately, as they have slightly different aims and emphases.

Firstly, there is a body of literature which is primarily concerned with changes in knowledge production and knowledge validation by means of an extended social inclusion (cue: Mode 2, socially robust knowledge).

Secondly, there is a perspective which focuses on the particular value of lay knowledge and its introduction into the various regulatory loci.

Thirdly, a broadly Habermasian approach, labelled deliberative democracy will be explored, which is primarily concerned with rationality-gains from deliberation, i.e. the value of establishing fair and competent forums for the exchange of arguments.

These different literatures are primarily diagnostic and/or prescriptive. In order to get an initial empirical hold on some of the issues set out for discussion here, in a next step I go on to discuss approaches to Technology Assessment (TA) and how these (normative) social analytical approaches have developed in symbiosis with attempts to establish participatory forms of technology assessment (PTA).

Chapter III: The roots of technological controversies – the sociology of risk

In the third chapter the level of sociological abstraction is somewhat raised, as I attempt to establish an analytical framework to guide the case studies. In order to do so I seek to locate technological controversies analytically in the structural context of modern societies. To this end I draw upon the systems theoretical framework of Niklas Luhmann, which will serve three purposes. Firstly, it will serve as a meta-theoretical framework providing assumptions about the social world.[6] Secondly, it provides some basic assumptions about the structural features of modern societies. These will, on the one hand, be used to locate the roots of contemporary controversies over technologies in a functionally differentiated society inevitably producing different kinds of risk. On the other hand, it will be used to predict some of the expected difficulties for participatory and deliberative procedures, which in this framework must be considered as structurally grounded rather than accidental. Thirdly, the systems theoretical framework will be used to develop some conceptual tools and distinctions to sharpen the observations of the empirical material. Here, I have in mind a genuinely sociological understanding of 'risk' and 'trust', which are otherwise often reduced to their, respectively, physical and psychological components.

However, it can be argued that the Luhmannian theory is strong in providing explanations of the structural roots of a number of challenges modern societies create for themselves, and that it provides a sophisticated vocabulary to discuss these challenges. Yet the approach is perhaps less well-equipped to register and analyse variation within modern socie-

[6] Within this I consider communication as the fundamental unit of analysis, the distinction between system and environment as constitutive for organised social complexity, the distinction between first and second order observation, the autopoiesis and operational closedness of social systems, a distinction of social, substantive and temporal elements of all communication etc.

ties. Therefore, the systems theoretical framework will be complemented with other theoretical tools. Central here is the concept of *public sphere*, which does not have strict systems theoretical parallels. However, its compatibility with the systems theoretical framework will be discussed, as will insights drawn from the 'Cultural Theory' approach to risk analysis.

Chapter IV: Methodology and selection of cases

As a bridge between the theoretical reflections and the case studies the fourth chapter serves three purposes. It develops an operationalistion of the theoretical reflections, which hopefully serve to simultaneously render the cases comparable and facilitate the description and analysis of their differences, it presents some methodological reflections on how the material is compiled and analysed, and finally it accounts for the selection of the cases.

Chapters V, VI and VII: Case studies

Chapters V, VI and VII include the bulk of the empirical investigation of the thesis as each describes and analyses one case. The case studies focus on establishing what I call the operationalisation of the public in different procedures as well as assessing their effects on the configuration of their respective policy arenas. The three cases are, as mentioned, based on material from Denmark, the United Kingdom and Germany. This means that in addition to being 'direct' products of the application of deliberative and participatory procedures to technological controversies, they must be seen as products of particular policy contexts which must be taken into consideration. Of central interest is how the cases are configured on the dimensions outlined in the operationalisation, and what challenges the procedures are confronted with compared to their self-prescribed tasks. On the one hand the cases are characterised and analysed according to the same conceptual scheme, on the other each case is taken as an occasion to highlight a specific type of challenge to such participatory and deliberative procedures.

The Danish case focuses on two procedures. Firstly, an attempt to develop general ethical evaluation criteria to guide, or at least influence, paths of biotechnological development. This attempt at 'institutionalised ethics' developed in two parallel processes, a bureaucratisation of ethics and a feeding of 'ethical principles' into a public debate, which was claimed to be important, but was not coupled in any formal way with decision-making procedures or institutions. Secondly, the Danish case discusses the format of 'consensus conferences', which have become a well-established methodology for public participation in Denmark and have attracted significant international attention. The basic principle is that 'informed' lay people deliberate in cooperation with experts to apply the 'moral competencies' of the public to the cognitive competences of experts. Here, sensitivity to the configuration of expert input, as well as coupling to the centres of decision making are critically examined. Particularly pronounced in the Danish case is what I call the 'problem of resonance'.

The British case revolves around a procedure named 'GM Nation?', which was carried out by the British Government in the summer of 2003. The format of the debate was new in the British context, and it will be argued that the aims were both unclear and controversial. Therefore, particular attention will be given to the organisation of the process. The process was 'all-inclusive' in the sense that no one was excluded from participating (in one specific phase of the process). This meant that the process had a considerable element of lay involvement. There was also extensive use of expertise, as a scientific workgroup was formed especially for the procedure. However, there was no direct lay-expert interaction. As such the case illustrates some of the transmission problems such procedures encounter, both between different social groups and different 'perspectives' on the same material topic, as well as between the elements of the procedure and the surrounding society, notably the political system. The all-inclusive approach meant that the process was exposed to accusations of self-selection bias. Therefore, here what I call the 'problem of inclusion' is particularly pronounced.

The German case, finally, focuses on a more corporatist approach to mediation in technological controversies. The case centres on a round table discussion initiated by the Government and including a wide circle of stakeholder organisations called 'Diskurs Grüne Gentechnik'. This process had a stronger coupling with the centre of the political system than the other cases. It also had participatory elements in terms of process and output control, but raises issues about representation of the interests of 'the public' via organisations. A further issue that this case highlights is the problem of strategic behaviour in procedures that are intended to be discursive. There was a tendency for conflict to be reiterated rather than mitigated in the procedure examined, which is why I take the German case as an opportunity to discuss what I call the 'problem of mediation'.

Chapter VIII: Comparative perspectives

Although the procedures investigated in the case studies are rather different in a number of respects, the eighth chapter will attempt to compare them along three dimensions. These dimensions are derived from the case studies as 'challenges' to such procedures, which are labelled, respectively, construction of representativeness, construction of competence and links to policy-making. Although each of these problems is arguably particularly pronounced in one of the cases, I argue that they represent issues all such procedures must confront. The aim of the chapter is to map and explain the different selections made in the individual procedures on each of the dimensions and what effects these differences had on the use of the procedures in their respective contexts.

Conclusion

In the final chapter I summarise what I believe has been learned through the investigation, discuss the strengths and weaknesses of the chosen approach to the material and the results relevant to this particular field of study and suggest some issues for further research.

Chapter I

The Anatomy of a Technological Controversy

The general aim of the thesis is a sociological investigation of allegedly new and 'alternative' modes of science and technology policy-making, which addresses the tension between, on the one hand, normative expectations of democratic inclusion and, on the other, the necessity of a high level of expertise that by nature is highly exclusive in a deliberative and participatory manner. It seems beyond doubt that the arguments in favour of, and experiments with, more inclusive forms of policy-making have emerged due to the fact that the introduction of new technologies have become contested and the object of social controversies in a way that seems more intense than earlier experiences. Biotechnology is perhaps one of the most obvious examples of this phenomenon. I therefore assume – albeit without undertaking extensive comparisons with other technological domains – that the controversies over modern biotechnology are useful for studying processes of heightened conflict potential from new technologies.[7] The aim of this chapter, however, is to gain a preliminary understanding of the 'anatomy' of the controversies over modern biotechnology.

No-one today is likely to disagree with the general statement that modern biotechnology is controversial. There is little consensus, however, on the subject of just what exactly these controversies consist, nor of why they seem to be so persistent. Here, therefore, the task will be to look at how these controversies have been observed and interpreted sociologically. Furthermore, the chapter will describe some of the regulatory challenges modern biotechnology poses and – in broad terms – how they have been dealt with, in order to situate the processes to be studied in the context of their intervention.

The social appropriation of biotechnology has been the object of a varied body of social research. Obviously, this cannot all be reviewed and discussed here. The aim of the chapter will therefore be to introduce some of the themes, approaches and empirical results which seem most important for the investigative task at hand. The chapter will provide at least some elements of an understanding of a) what the controversies are 'about', b) how they have unfolded and c) how this has been made the object of social scientific discussion and observations. In doing so, I shall start off with a few conceptual clarifications, following which I move on to a discussion of some of the existing literature central to the topics at hand.

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[7] As such, the investigation should to some extent be generalisable beyond the biotechnology domain to other areas where cognitive, socio-economic and normative uncertainties intermingle. The discussion of the generalisability of the findings will, however, be postponed to the concluding part of the thesis.

Controversy and Biotechnology as Objects of Sociological Investigation

When discussing controversies over biotechnology it is useful to clarify what exactly is understood both by *controversy* and by *biotechnology*. The first task were will therefore be to approach how these are constituted as objects of sociological inquiry.

As will be discussed further in Chapter III, this thesis takes a communication-based approach to social analysis. In such an approach it can be argued in a general manner that *controversies* are present when 'objections' are communicated. If one assumes that modern societies tend by default to be innovation-friendly, i.e. if nothing else speaks against them, technological innovations are allowed and generally accepted and encouraged (provided they do not entail unacceptable, foreseeable physical risks to human beings or the environment, or clearly disregard the existing normative order). *Technological* controversies can be said to be present when objections to the introduction of new technologies are communicated – for whatever reason. This is of course a very general definition of controversy, and it is clearly the case that not all types of objections, nor all objectors, have the same effect or trenchancy on the shaping of technological trajectories or regulatory frameworks. Hence, controversies must be specified in substantive, social and temporal aspects in order to be analysed adequately. It is also evident that the developments in modern biotechnology are contested in a number of social contexts, in a number of ways and for a number of reasons. Hence, one cannot talk about *a* controversy in the singular, even if the perspective is delimited to agricultural applications, which is the primary focus of this thesis. Furthermore, 'the controversies' are often diffuse (i.e. they lack a clear and generally shared substantive focus), and the cases to be investigated are different responses to different controversies in different settings. Nonetheless, as I shall show in the following, it is possible to identify certain recurring themes which have been investigated and discussed in the social research motivated by the lingering controversies. This will inevitably entail a simplification of some of the matters at stake, but should be read as an attempt to get a handle on the complexity involved by focusing on some aspects rather than others. The selection of issues to be reviewed is therefore guided by the research question and looks primarily at a) how 'the public' as a central part in the controversies have been constructed and investigated in social research and b) how biotechnology has at the same time been made the object of regulation and challenged regulatory practices.

The social scientific observation of technological controversies is not necessarily a neutral activity. This raises two issues which require attention in this context. First, as always when doing social research, the categories through which the controversies are observed are both enabling and limiting in terms of what can be analysed. This is a problem that cannot be by-passed but must be reflected upon when selecting the research strategy. Therefore, at the outset it seems worth considering, consecutively, a number of perspectives present in

the literature, partly to get a relatively 'thick' description of the issues at hand, and partly in order to contrast these and make an informed decision on which is more useful for the investigative task. This initial broad view is also motivated by the second point to be considered, namely that the controversies over biotechnology have to some extent co-evolved with the different social scientific observations and analyses of them. Observations, concepts and analyses have fed back into the controversies, and social scientific observers have often deliberately intervened in the controversies on the basis of their research. This is particularly evident in experiments with public participation. Therefore, attention to the temporalities not only of the controversies, but their observation by social researchers is necessary. Basically, to understand the controversies it is an advantage to know how social scientific observations have accompanied them practically from their outset.

Just as what I call technological controversies are viewed in different ways, so is their material object, that is biotechnology. The approach of the thesis is non-technology deterministic, as it is assumed that the communication about biotechnology is not determined by characteristics of the physical properties of the technologies. Even where it can be argued that the material characteristics of the technologies in question seem to profoundly influence the social responses to them, this will always be 'mediated' through communication, which to some extent is 'free' to choose its frames and distinctions. The material substrate of modern biotechnology can, following Bauer and Gaskell, be understood broadly as "... processes, products and services that have been developed on the basis of interventions at the level of the gene." (Bauer and Gaskell 2002a: 3). Such interventions and their implications are, however, observed with very different distinctions and purposes in different parts of society. Therefore, as will be seen throughout the thesis, the labelling and naming of the technology is itself a central element and means in the controversies. This is obvious when anti-GMO activists use labels such as 'FrankenFood' to stigmatise the latter, but it also takes on more subtle forms. For instance, in the light of lingering controversy, labels have gradually been modified by the proponents of the technologies in order to convey more positive images. When the technology was in its incipient phases the scientific community spoke of 'genetic manipulation'. This was gradually replaced by 'genetic engineering' or 'gene technology', which again has given way to 'biotechnology' and 'the life sciences' (Bauer, Durant and Gaskell 1998: 217). Even 'life sciences' as an overarching category is now progressively being abandoned in order to symbolically insulate publicly more acceptable applications in the medical domain from associations with the less publicly acceptable agricultural applications (Grabner et. al. 2002: 15). The issue here is clearly not a more precise use of the language describing the material artefacts or the fact that something fundamentally different is being named, but a strategy that a less 'offensive' naming will improve popular acceptance.

However, changing semantic labellings are not only a means to achieve acceptance of the new technologies. More fundamentally, the discursive and definitional struggles are also co-determining responsibility for the effects of the technology. In an abstract sense one can say that biotechnology touches upon the distinction between nature and culture, and that this is in fact at the heart of many of the controversies, even if this is not always explicitly recognised by the contestants. The border between nature and culture is characterised by and characterises the limits of (moral) responsibility – at least in what one could call a modern conception of nature (Latour 1993). Nature abides by laws that do not fall within the scope of human actions – hence, we are not responsible for its outcomes. As technical capacities allow us to manipulate still more elements of nature, still more natural processes are moved into the domain of possible human intervention, they become encultured, and hence turn into objects of our responsibility – moral, as well as economic, legal and political. This responsibility, however, must be perceived as a product of social negotiations over meaning and norms. In this perspective it becomes clear that different interest-positions try to use the fluid status of the nature/culture-distinction strategically in the discursive conflicts to make their framing of the issue dominant.[8]

There are different and competing interpretations of whether modern biotechnology should be understood as (just) a series of better and more precise breeding techniques, or a radically new way of intervening in nature with potential synergistic, and adverse effects. It can be argued that humans have deliberately altered plants and animals through selective breeding more or less as long as there has been agriculture. Crop plants and husbandry animals are not 'natural' and many species could not survive without human intervention and nurturing. Proponents of biotechnology argue that genetic engineering is just a small step forward on a long path that will allow us to refine the methods and precision of breeding, and that ethical objectives are misplaced, as there is no reason why GM technologies should be any more objectionable than other attempts at targeted breeding. This is in effect an attempt to symbolically normalise biotechnology by comparing it to something familiar. Opponents, on the other hand, argue that intervening on the genetic level and possibly transgressing species boundaries is something qualitatively different and may entail risks of a 'different kind' and thus pose ethical issues that need clarification in advance of its acceptance as it will profoundly influence healthcare and food production. Therefore, 'special' attention and precaution is required.

It has been observed that in these controversies the 'context dictates the rhetoric' (Bauer 1995: 10), in the sense that for purposes of fund-raising for research, 'novelty' and 'revolu-

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[8] As argued amongst others by Lau: "*Grob vereinfacht beabsichtigt ein Teil der Akteuren, einen gesellschaftlich-technischen Sachverhalt – wie etwa die Freisetzung gentechnisch manipulierter Pflanzen – umzudefinieren in einen natürlichen oder naturkonformen Sachverhalt. Gelingt dies, so hat zunächst einmal das Problem seine soziale Sprengkraft verloren. Der andere Teil der Konfliktakteure versucht das Phänomen im Bereich gesellschaftlicher Kompetenz zu belassen, indem er es entsprechend kausal zuordnet.*" (Lau 1999: 299).

tion' are invoked by the proponents of biotechnology, whereas to prevent restriction by regulation and public controversy, continuity with older, well known processes is underlined (Jasanoff 1995). In short, scientists have to sell 'revolution' to get financing and 'evolution' to get public acceptance (Hasse and Gill 1994).

Between proponents and critics, the 'newness' or 'naturalness' of various processes and products in biotechnology seem to be a continuing point of contention unresolvable with reference to scientific knowledge or data alone. It is influenced instead by different actors' 'problem-horizons'.

However, as little as these issues can be settled within purely scientific boundaries, neither can the controversies be resolved with reference to sociological observation. Therefore, no attempt will be undertaken to assess if, and under what circumstances, one viewpoint is more 'justified' than another or according to what standard or by the use of what distinctions this could possibly be achieved. Rather than 'intervening' in the issues, the thesis therefore retreats to an epistemological position of second order observation, assuming that it is beneficial to *observe the observers* and investigate how various images are invoked for certain purposes and what communicative dynamic this initiates. Arguably, for a sociological observer it is less fruitful to ask to what extent the controversies are 'really' grounded in the material characteristics of the technologies and to what extent they are 'social artefacts' grounded in interest maintenance. From a disciplinary standpoint in sociology one can 'only' analyse how they are communicated, what arguments are brought into the controversies, and which manage to manifest themselves in which contexts – perhaps indirectly contributing to societal self-reflection.[9]

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[9] Although the material substance of many of the controversial aspects can be traced back to specific discoveries in molecular biology and their subsequent technological application in a number of domains, the potential for social conflict over biotechnology did not emerge with the advent of genetic engineering. Rather, it seems biotechnology emerged on the horizon of societal attention at a time when a certain sensibility towards (adverse) ecological and social effects of large technological programmes, notably nuclear power, had been developed by substantial parts of Western European publics, accompanied by organisational resources formed to express concerns politically. Although there is no doubt that valuable lessons could be drawn from closer comparisons between controversies over nuclear power and biotechnology in a number of respects (see e.g. Bauer 1995), this will not be pursued in any systematic manner in this thesis. It will, however, be alluded to when it seems important to certain understand aspects of the cases. At least two aspects of the controversies over nuclear power seem especially important in this context: in many countries they challenged a technocratic hegemony, which had formulated science and technology policy on a rather exclusionary basis at least since World War II. In doing so they not only created the counter-expert figure, they also demonstrated to broader segments of the public that scientific policy advice is neither necessarily as cognitively well founded as it claims nor free of interest. Scientific expertise proved to be a resource in social controversies and not merely a neutral arbiter based on certified knowledge. Secondly, new ways of mobilising and organising political activity were learned and in some cases proved quite influential. Due to public opposition nuclear power proved significantly less successful in Western Europe than expected by its promoters in its incipient phases. This led (some) proponents of biotechnology to pay attention to public acceptance issues from the outset, which has influenced some of the accompanying social research.

Social Research in a Polarized Controversy

For many of the actors involved in the controversies, in particular the promoters and regulators of the new biotechnologies, the persistency and force of the controversies were considered with some surprise and incomprehension, as their nature for many experts seemed diffuse and without basis in 'reality' (Hasse and Gill 1994). Employing William Ogburn's classic concept (1966), the *cultural lag* following the introduction of this new technology was apparently impossible to 'close', as the issues involved are perpetually reframed and (re)politicised, making it difficult for societal institutions to 'normalise' the use of the technology. As the controversies are diffuse and have no single locus, it is perhaps more correct to say that they consist of not one but many *lags*.

This continuing controversy has inspired social scientific research on different topics related to the social appropriation of biotechnology. This research, of course, stems from different existing research traditions and does not make up a coherent body of work. It is to some extent shaped by the desire to create relevant knowledge for various policy-making objectives or to lend support or legitimacy to certain positions in the controversies. Some of the research therefore seems to be driven by extra-scientific motives. As the controversies tend to be rather polarised, some of the research clearly exhibits 'sympathies' driving it to focus on certain aspects of the controversies rather than others. This does not necessarily mean that the quality of the research is compromised, but it does demonstrate that several stories can be told about the controversies.

In the following I shall look at central findings from three research fields. The first is public (risk) perception studies (i.e. attempts to establish what public concerns are 'about' and how they are structured.) The second pertains to observations of the dynamic of the controversies, which obviously are symbiotic with, but not necessarily identical to, the content of 'public concerns'.[10] Third, I shall trace some of the general principles of the policy responses to the controversies as they are manifest in the regulation of biotechnology.

One characteristic of the controversies over agricultural biotechnology noted by many observers is that despite the fact that they cover multifarious topics, they have a fundamentally polarised character.[11] It seems that the organised actors involved in what Bauer and Gaskell call the 'biotechnology movement' (meaning all the involved actors, promoters and sceptics alike, giving the field its dynamic (Bauer and Gaskell 2002b)) tend to or are forced to 'choose sides' and therefore process all information, be it political, economic, scientific,

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[10] This is so for two reasons: First, organised actors (companies, research organisations, regulators, NGOs, the media etc.) contribute to the creation of public concerns and wishes just as much as the 'represent' them. Secondly, because the actors in the controversies operate within existing structures that do not (always) allow public concerns to be manifested in unmediated ways.

[11] See Bauer and Gaskell 2002b for a conceptual model of the polarising dynamic of the controversies.

ethical or regulatory, through a meta-programme of 'for or against'. This means that communication in any of these modes on the programmatic level is superimposed with preferences or commitments towards biotechnology of either a supportive or a sceptical inclination. This is visible in some of the social research into the controversies as well, where it finds expression in the selection and formulation of research problems, e.g. whether controversies are framed as 'acceptance problems' (predominantly technology supportive) or 'legitimacy or democracy problems' (predominantly technology sceptical).

One distinction, which is often applied in the debates (and the social research observing these), is that between lay people and experts. This distinction does not coincide socially or thematically with 'for or against' positions. Nonetheless, since the controversies are often seen as scepticism towards new technologies by the public, which is almost by definition 'lay', and low confidence in the regulators and promoters, who often have some kind of scientific credentials and operate on the basis of scientific knowledge, the two distinctions at times tend to overlap or conflate. This has led to a significant interest in public (risk) perceptions in explaining the (persistence of the) controversies. To some extent this research has been informed by a research programme initiated before biotechnology became seriously contested in the public domain, and which is concerned with technological risks in general. However, as this approach has been quite influential on subsequent research, I shall briefly introduce it.

This programme initially took over 'the experts'' interpretations of risk, and thus shaped much of the understanding of the controversies. There can be little doubt that most of the initial social research on risk, especially lay responses to risk, was initiated primarily to understand why lay people did not perceive risk in the same way as experts – or at least why they paid what was considered to be insufficient attention to expert knowledge and recommendations – and how this could potentially be changed. The problem was double-edged. On the one hand, it had repercussions for the acceptance of new technologies, which were dreaded and resisted in what many expert observers considered irrational ways. On the other risky behaviour and activities like unhealthy diets, smoking, neglect to use seatbelts in cars etc. continued in spite of expert knowledge recommending against them.

This research was informed by what has critically been termed a 'cognitive deficit model' (Irwin and Wynne 1996). Its basic characteristic is an assumption that expert (scientific) knowledge on risks and the causal mechanisms causing these provide a rational baseline in the determinations, interpretation and prevention of risks – and therefore ought to guide the evaluation of their acceptability. The model's major object of investigation was then how and why lay-people's conception, attention and evaluation of risk deviated from this knowledge base. The fundamental conceptual distinction was one between the (scientifically or rationally established) 'objective' risk and the 'subjective' risk perceived by lay people. The premise was that scientists were rational in their approach to risk and deviations from the expert perception of risk were to be considered somehow deficient, either in

terms of receiving information or acting rationally in accordance with the received information (Hansen et al. 2003). Within this research tradition investigations were developed on how communications to lay people may best be made in order to align their views with those of experts – what is known as *risk communication* (NRC 1989).

Initial research in this tradition had a strong cognitive focus. For instance, investigations into lay understandings of probabilistic logic seemed to indicate 'flaws' in the ways lay people dealt with expert information (Slovic, Fischhoff, & Lichtenstein 1982). Over time, however, several of the initial assumptions of this approach have been modified.[12] This is due to several factors. One important factor was the recognition that experts do not themselves work according to ideal scientific standards, often have hidden normative assumptions built in to their assessments, and make estimates that are not underpinned by systematic research (Slovic, Fischhoff, & Lichtenstein 1982; Wynne 1996). However, another and perhaps more interesting finding in this *psychometric paradigm* was the acknowledgement of the 'multidimensionality' of risk perceptions. Where scientists, especially when acting as experts providing advice, estimate risks, they usually work according to one-dimensional scales, for instance (estimated) mortality rates, level of intoxication, costs, etc., and thus it was found that lay cognition took more dimensions into consideration. As a result the psychometric paradigm moved to a more 'symmetrical' research strategy were lay perceptions where no longer understood as deviations from a singular rational reservoir of knowledge, but rather as phenomena with their own logic, worthy of investigation in their own right. It then became clear that many different aspects or characteristics of risks are decisive for how laypeople perceive risks. Slovic shows how factors like uncertainty, 'dread', catastrophic potential, controllability, equity and risk to future generations all influence what is perceived to be risky and/or acceptable by laypeople (Slovic 1999). It was furthermore acknowledged that where technical risk assessment considers risk and benefits independently of each other, this is not the case in lay risk perception.

The psychometric paradigm is perhaps the most elaborate framework that has informed empirical investigation into risk perceptions. However, it is basically a psychological approach to risk perception. This means that research in this tradition normally works with models of cognition and influential factors that are independent of or only marginally influenced by the social, cultural and political context in which technological risks are situated. In short, public reactions were explained almost exclusively with reference to the characteristics of the risks. This provoked criticism from sociological quarters, mainly focussing on the fact that perceptions of risk cannot be adequately understood without taking

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[12] "*Diese Entwicklung kann kurz als sukzessiver Abschied vom Glauben an eine überlegene Rationalität des quantitativen ingenieurwissenschaftlichen Risk-Assessment gegenüber der Risikobewertung von Laien und verstärkte Berücksichtigung des gesellschaftlichen Kontextes der Konstruktion von Risikobewertungen gekennzeichnet werden.*" (Hennen 1994: 466).

into account the social, political and cultural context in which the risks are generated (e.g. Otway 1992; Wynne 1992, Douglas 1992). It was argued that risk is not something that is passively received by lay people, but rather actively constructed and interpreted as part of everyday life practices.

The psychometric paradigm brings us some way towards an understanding of why GM food is viewed with scepticism among the public. GM food fills many of the categories identified as leading to a heightened risk awareness. GM food is novel, not well understood, man made, personal experience is difficult to obtain and so far benefits are perceived to fall almost exclusively on the producers. However, the approach lacks a way to conceptualise that people respond not only to the characteristics of the risks in question, but also to the context in which these are produced, managed, distributed and accounted for.[13]

Biotechnology and the Public in Surveys and Qualitative Research

In Europe a central source of knowledge about public attitudes to biotechnology are the EuroBarometer surveys, which have been carried out at regular intervals since the early 1990s. The surveys are one of the primary sources of quantitative data in the research field of public perceptions, and are probably also the source that draws the greatest attention in policy arenas. Although the EuroBarometer share some of the methodology and social ontological assumptions of psychometric research, it has significantly expanded its field of interest to include evaluation of social actors as well. [14]

A central task of the EuroBarometer surveys has been to monitor the support for or acceptance of biotechnology. Debates over nuclear power had already shown that the introduction of what was initially believed an uncontroversial 'technology of the future' was significantly influenced by acceptance problems and public controversy. Therefore, attempts to gather social intelligence about the reception of biotechnology as another strategic technol-

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[13] An additional issue, sometimes brought out in the present day social scientific discussions about risk perception, is that although the distinction between objective physical risks and perceived subjective risk largely have been abandoned by social researchers, it still implicitly or explicitly informs the worldview and behaviour of technology promoters and regulators (Wynne 2001a, 2001b, Marris et al. 2001), perhaps because it offers a model to interpret the conflicts, which places the roots of many of the difficulties these organisations experience with the lay public, rather than with their own practices. This is an example of the effect mentioned earlier that there is a certain interaction between the biotechnology controversies and the social scientific observations of these.

[14] It is not the purpose of this thesis to measure the extent of public resistance to or acceptance of biotechnology as such. However, in order to investigate if and how public scepticism can be articulated and made relevant for policy making in new ways, it is preferable to have an understanding of the anatomy of the concerns of the public (as well as how such survey results are articulated and interpreted in the relevant policy arenas). What is of interest here is therefore not the individual distributions or the research methodologies involved, but the results that are feeding into the debates about how the controversies can and should be addressed. It can furthermore be argued that surveys construct a particular image both of the issues at stake and 'the public', which has been quite influential.

ogy has followed it practically from the outset of its development. The surveys monitor a number of variables pertaining to scientific literacy, awareness of and attitudes towards the different applications of biotechnology and assessments of actors and social institutions involved with the technologies.

Support or acceptance of technology is not a 'natural' or one-dimensional scale, and it is not a simple task to measure it reliably. In the EuroBarometers two strategies have been followed. One is a comparison of biotechnology with other technologies, another is a differentiation between different applications of biotechnology. As the measurements are repeated at regular intervals all over Europe, temporal dimensions and cross national comparisons can be added to the pictures of public support.

When compared with seven different technologies (solar energy, computer and information technology, telecommunications, space exploration, the Internet), a generic concept of biotechnology/genetic engineering consistently scored second lowest on the question of whether these technologies would improve or decrease quality of life over the next 20 years (across all European countries in 2002).[15] Nuclear power consistently scored the lowest. Biotechnology consistently fell within the scores of technological optimism during the 1990s but increased somewhat between 1999 and 2002. The surveys lead analysts to conclude that the European populations can by no means be characterised as technophobic, nor are their assessments of technology driven by a general risk aversion (Gaskell et al. 2003: 11). However, the less positive images of biotechnology compared to other technologies demonstrate that it may well be more prone to become an object of controversy than other technologies (with the exception of nuclear power).

The comparatively lower technological optimism in regard to biotechnology and genetic engineering as generic categories covers the fact that different applications of the ability to intervene on the genetic level are perceived differently among the European populations. The EuroBarometer surveys show as a consistent pattern that medical applications receive higher support rates than agricultural applications. This has led to a commonly used distinction between 'red' and 'green' applications. When asked whether various applications were considered *useful for society, risky for society, morally acceptable* and whether they should be *encouraged*, GM crops and especially GM food received consistently lower approval rates than applications in the medical domain.[16]

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[15] 'Biotechnology' and 'genetic engineering' were presented in a split ballot sample. Genetic engineering was generally rated lower than biotechnology. This is interpreted to indicate that 'biotechnology' and 'genetic engineering' mean different things to the European public (Gaskell et al. 2003: 9), which underlines the importance of the struggles over semantic labels.

[16] The approval rates obviously vary across different European countries. However, as the 'structure' of concerns appear to be similar it does not seem important to discuss the numerical differences here.

One interesting result of the analysis of the data is that when the answers to the four indicators of approval mentioned above are dichotomised they can theoretically form sixteen different combinations. However in reality the respondents that can be labelled as 'decided', i.e. those that did not answer 'don't know' to one or more of the questions (approx 50%), primarily cluster around three positions, which the EuroBarometer analysts label 'Supporters', 'Risk Tolerant Supportsers' and 'Opponents'. The 'Supporters' are those that see the technologies as useful, who are not very concerned about the risks and who have no moral objections. They think that applications should be encouraged. The 'Risk Tolerant Supporters' are those that see the technologies as useful but risky and have no moral objections. Hence, they are willing to encourage the technologies (presumably given that risks are contained). Finally, the 'Opponents' are those that find the applications both risky and morally objectionable and hence do not encourage them. In regard to GM crops and food the number of opponents increased between 1996 and 1999 and did not change in 2002 (Gaskell et al. 2003: 16). For GM crops approximately 30% belong to the 'Opponents' category, whilst for GM food applications approximately 50% do. Analysts have concluded that where support for medical applications has increased, support for GM crops and especially GM food shows no sign of changing. However, the large rates of 'don't know' responses can be interpreted as a signal of significant ambivalence in the face of many of these technologies.

A topic which has received quite a bit of attention is the determinants of acceptance and support for biotechnology. Traditional socio-economic variables like age, gender and level of education play some role, but are able to explain only a minor part of the variation in acceptance and support. The relation between knowledge and acceptance, a question inherited from psychometric research, has been the notable object of some investigation. The EuroBarometer includes a section that probes into scientific literacy by asking 'knowledge questions'. There seems to be only a weak correlation between knowledge and acceptance (ibid: 19). By now, and contrary to the assumptions of the deficit model, it counts as a well-established finding that there is no uni-linear relationship between text-book knowledge of biotechnology and acceptance of the various applications. This is true both when the unit of analysis is individuals and when it is aggregated to country level (more 'knowledgeable' populations do not exhibit higher approval rates). Instead the EuroBarometer analysts construct a measurement of *engagement with biotechnology*, which is not constructed only on the basis of scientific literacy but also on the reported and intended behaviour of the respondents, for instance whether they have discussed biotechnology with anybody, if they would watch a TV programme about it etc. This leads to results indicating that those that are most engaged with biotechnology tend to see more use for it, to find it morally acceptable and to encourage it. However, there seems to be no influence of engagement on the perception of riskiness. This leads the analysts to conclude that:

"The 'knowledge deficit model' of the public in relation to science and technology gives some indication of the bases of positive and negative attitudes, but certainly does not tell the whole story. It is too simplistic to attribute opposition to science merely to a lack of knowledge and to suggest that a dose of scientific information will cure people's scepticism." (Gaskell et al. 2003: 27)

Hence, knowledge of and engagement with biotechnology, thus understood, makes it more likely that a position is taken. However, there is no uni-linear relationship between knowledge/engagement and acceptance and support.

Obviously, support or scepticism is not determined solely by the characteristics of the technologies, or by understanding the science involved. Evaluations of the social institutions responsible for the management of the technologies and the behaviour of the actors in the arena are also central. The EuroBarometer approaches the issue of trust and confidence by asking the respondents two types of questions, which they take to be proxies for social trust. The first concerns who the respondents believe are 'doing a good job for society' in the biotechnology area, and the second who they would 'trust to tell the truth' about biotechnology. Apart from the peculiarity that there seem to be significant differences in the scores on the two indicators ('doing a good job' and being 'trusted to tell the truth' apparently do not carry the came connotations) the most significant and persistent finding on these trust questions is that consumer associations and environmental organizations are the actors that score the highest, whereas national governments, regulatory agencies and industry score the lowest (Gaskell et al. 2003: 32-33). As such, it seems that those actors expected to have the most knowledge and competence are the ones that command the least public confidence. The EuroBarometer has no explanation for this, but below I shall discuss suggestions from qualitative research that indicates that this is not necessarily an indication that the public is misguided by a symbiosis of sensationalist medias and ideological social movements, as is often suggested by the promoters of the technologies. Rather, it can be interpreted as a desire for access to multiple sources of information, which will allow people to balance different perspectives (Marris et al. 2001).

In a more sophisticated modeling of the 1999 EuroBarometer data, analysts found two new points of interest for the current investigation. When they analysed the relationship between an index of what they call trust in the food-chain (Government, industry, retailers), risk perception, a measure of technological optimism, engagement with biotechnology (all independent variables) and support for GM food (dependent variable) it was found that country dummy variables are significant in only three cases (Spain, Italy and Finland). The authors take this as an indication that Europeans represent biotechnology in shared terms, such as trust, risk etc. (Gaskell et.al. 2001: 74). Hence, apart from the three country exceptions, the mechanisms determining support for GM food is similar in different national contexts in Europe, even if the relative weight of the factors differs. As such, it can be ar-

gued that the controversies are 'similar' not just in the sense that they are about the same material objects, but also in that they are manifestations of similar public concerns.

Characteristically, in most research on acceptance it seems to be assumed as an implicit baseline that technologies *should* be accepted, and so it is deviation from this expectation that needs to be explained. At least most of the analytical effort devoted to the Euro-Barometer data goes into describing and analysing the sceptics and their motives, whereas characteristics and motives of the supporters receive less attention. For instance, the authors contrast two groups as having quite different motives or ways of opposing biotechnology, indicated as 'blue' (traditional) and 'green' (modern) opponents. The "'blue' traditionalist group tends to be older, less educated, less concerned about the risk, less knowledgeable, inclined towards the right of the political spectrum, more religious, materialist rather than postmaterialist in outlook and living in rural rather than urban settings."[17] (Gaskell et. al. 2001: 75). The 'blue' argument is described as having no external references, it is closed around its own values, and is hence described as 'Faustian'. The modern 'green' opponents, described as 'Frankensteinian' are more occupied with risks than 'morality'. This group is described as unassociated with any particular social groups and its modality is conditioned by the state of knowledge, rather than the inherent undesirability of interfering with nature. Notably, no similar analyses are performed for the respondents expressing support for GMOs, they appear to command significantly less interest as research objects.

The EuroBarometer surveys have been an influential source of information on the public perceptions of biotechnology in Europe. As such they have in a sense also structured what is known and communicated about 'the public' in a number of contexts. However, survey research is but one way of gaining access to the concerns of the public, and a number of qualitative studies (especially focus groups) have been undertaken to support, expand and modify the pictures emerging from survey research. This body of research cannot for obvious reasons be discussed in detail here, but some of the insights gained and puzzles raised are worth mentioning. This I will do by discussing the results of a few studies which I believe to cover many of the important issues.

Some of the more interpretive studies 'confirm' certain insights gained from the Euro-Barometer studies. In comparative qualitative studies it has for instance been found that perceptions of GMOs and accompanying concerns are largely similar across European countries (Wagner et al. 2001: 81, similar conclusions in Marris et al. 2001). This was found to be true independently of the history and intensity of public controversy at the time of investigation (Marris et al. 2001: 46)

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[17] As compared to the 'greens'.

A further result that connects well with the EuroBarometer analysis – and also points to the limitations of the survey approach to public perceptions – is that 'risk' does not seem to capture public concerns particularly well. Wagner et al. observe that risk is not a concept that figures prominently in the discourses of the participants in their focus groups, especially not in its probabilistic form (Wagner et. al. 2001: 85). Instead, worries that are not necessarily well articulated pertain to non-predictable future events. These can be 'anchored' by, for example, food scandals or the Chernobyl accident, as a symbol of experts' ignorance and fallibility that has led to mishaps in the past. As such, people tend to take (long term) *uncertainty* as a given rather than the failure of science as such or of expert institutions. Uncertainty is understood to be a fundamental fact of life (Marris et al. 2001: 59)

Marris et al. (2001), in what is probably the most penetrating qualitative study of public perceptions of GMOs to date, draw upon data from five European countries to present a confrontation of their focus group results with what they describe as a number of myths about public perceptions prevalent among stakeholders in the policy arenas (regulators, scientists, industrialists, NGOs etc). They argue that these myths are mostly misconceptions, which means that some attempts to mitigate public concerns actually cause their proliferation. Marris et al. also argue that the categories of risk versus benefits do not effectively capture the roots of the controversies. Instead they argue that public perceptions should be understood as being about *uncertainties* versus *needs*. As such, some of the qualitative research also aims to 'dignify' public concerns in a context where opposition is often equated with ignorance and irrationality. This is done by showing that it might well be that many people do not base their evaluation of for example GM food on extensive knowledge of the technicalities, but rather on doubts about the need for the products and ability to manage the accompanying uncertainties. As such, their concerns are not intellectually vacuous and emotional as often suggested, but sensible and rational from the perspective of their everyday life experiences. These concerns can be interpreted as quite reasonable, because they are built on experiences with the past behaviour of institutions, rather than on deficient lay perceptions of scientific knowledge.

A shared result of many qualitative studies is that in public perceptions there is not necessarily any clear separation between risk, ethics and politics, as is often suggested (or implicitly assumed) by promoters and regulators. Hence, what many people are concerned about are not GMOs as technological artifacts, but rather about the institutional context in which they are developed, evaluated and promoted (Marris et al. 2001: 47). People hesitant about GMOs are not risk averse *per se*. However, they are not convinced that the uncertainties, which are felt to be inherent in all the science and technology that penetrates everyday life, are justified by the reasons and motives behind GMO promotion. People do not, as some stakeholders think, demand zero-risk in order to find biotechnology acceptable. What they object to, according to Marris et al., are the 'institutional denials' of existing uncertainties,

and the suggestion that science can adequately predict and control uncertainties, which are believed to be an inherent fact of life:

> *"This public experience of expert institutions as denying uncertainty seemed to be a major cause of public skepticism towards regulatory bodies, not the inevitable expert inability – typically recognized by the focus group participants – to create zero risk or total certainty. Rather than zero risk, what people demanded was a more realistic and humble assessment of risk by regulatory authorities and GMO producers, which acknowledged uncertainty and real life conditions."* (Marris et al. 2001: 60)

Therefore, the motives behind introducing the technology and the willingness to admit uncertainties and mistakes are likely to be more important for public trust and acceptance than assurances that no risks exist.

In addition to this, for many people GM food is not perceived as a response to any 'real' need. The investigations by Wagner et al. indicate that people bring value-orientations to decisions about their food that go beyond risk assessments and nutritional characteristics, and that GM food is seen not only as artificial, but in a sense also as 'anti-cultural'. Food and meals have symbolic meanings that contribute to a sense of identity. On this view, for example, GM food is seen as deprived of such characteristics: "Taste is not negotiable exactly because local foods and their tastes grew out of a long tradition of cooking that cannot be bettered by industrial means" (Wagner et al. 2001: 89). Hence, the "...style of preparing food becomes a shorthand for identity, for sensing oneself as belonging to a cultural group, a feeling that goes far beyond any considerations of nutritional value, WTO trading rules, or practicalities in industrial food production." (ibid).

The qualitative studies hence indicate *ambivalence* in the evaluation of GMOs, which is difficult to establish in survey research. Furthermore, according to Marris et al. the concerns based on such ambivalence are very difficult to address adequately within the existing regulatory framework and culture with its strong emphasis on science based risk assessment, as the latter aim to exclude ambivalence and 'deny' the kind of uncertainty that cannot be controlled. As such, much of the qualitative research indicates that public hesitation over GMOs rests on a sense of lack of agency and no perceived need, rather than (just) the physical characteristics of the technology.[18]

The qualitative research hence indicates that concerns about GMOs are intimately interwoven with a number of other concerns, some of which are related to the role, use and ac-

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[18] This is what Wagner et al. summarise in a metaphor of a runaway train;

"... fuelled by industrial science, without control signals along the tracks, leading to the silent diffusion of genetic applications into everyday life. The public is a group of mere bystanders who cannot participate in the decision-making, consumers who cannot react to this technological innovation by informed choices, politicians who at best struggle to adapt regulation to the present state and handle it with restrictions when the train has already passed the station, and ethicists who attempt to set morally defined boundaries. The technological imperative promoted by industry seems to be overwhelmingly strong" (Wagner et al. 2001: 83).

countability of science, and some with other issues altogether. As such, the technology becomes, to some extent, symbolic of a number of developments in modern life, which are often (perhaps simultaneously) sources of both satisfaction and anxiety. This is why the qualitative studies indicate that for many people there is no clear-cut case for or against biotechnology, but a matter of substantial ambivalence.

However, what emerges clearly from the qualitative queries into public concerns is the image that public concerns seem to follow different logics to the innovative and regulatory contexts that GMOs are developed and evaluated in. This is perhaps why there is a potential for perpetual controversy, which is difficult to accommodate either by increased communicational efforts or a compromise of interests, in short by the kind of policy measures conventionally used in the science and technology domain.

In seeking the roots of the controversies Marris et al. (2001) aim to show that popular concerns are not necessarily as irrational and emotional as some GM promoters make them out to be. Furthermore, they also try to show that some of the misconceptions feeding the debates are held by the stakeholders, who allegedly wrongly perceive what 'the public' is actually concerned about. They discuss this through the exposition of what they call ten stakeholder 'myths', which they challenge as misreadings of what is really at stake for the public (summarised in the following table).

	Myths	Challenges to myths
1	The primordial cause of the problem is that lay people are ignorant about scientific facts	Opposition is not related to 'text book' knowledge. Lay people bring different sorts of knowledge into their evaluations, mostly about social institutions etc.
2	People are either 'for' or 'against' GMOs	People are mostly ambivalent and willing to trade off risks and benefits – or rather uncertainties and needs – if they see a reason to do so consisting of 'social' rather than economic benefits.
3	Consumers accept medical GMOs but refuse GMOs used in food and agriculture	This assumption is too simplistic. It is not the medical characteristics of applications that accounts for higher acceptance, but the institutional configuration of need, control and surveillance.
4	European consumers are behaving selfishly towards the poor in the Third World	Europeans would like to help the Third World, but are sceptical that this will be achieved with the current ownership and control in biotechnology.
5	Consumers want labelling in order to exercise their freedom of choice	Market mechanisms are considered only one (insufficient) way to be able to 'signal' their wishes to technological innovations. Just as or more important than the fact that genetic modification has been carried out, is information on *why* it was done.
6	The public thinks – wrongly – that GMOs are unnatural	Use of other agricultural technologies (herbicides, pesticides, growth hormones) is also seen as 'unnatural'. GMOs are seen as one more (deplorable) step in the industrialisation of food production. This does not mean that all previous steps are seen as desirable or 'natural'.
7	It's the fault of the BSE crisis: since then, citizens no longer trust regulatory institutions	BSE is often used as anchor point, but is seen as something 'normal' or an inevitable outcome of agricultural practice and regulatory behaviour, not as something exceptional.
8	The public demands "zero risk" – and this is not reasonable	People are well aware that modern life entails risk. They are concerned about the accountability of the institutions in charge of risk management and according to whose principles they operate.
9	Public opposition to GMOs is due to "other" ethical or political factors	The public often does not perceive matters of physical risks as separate or separable from 'ethical' or political considerations.
10	The public is a malleable victim of distorting sensationalist media	Members of the public are not a *tabula rasa* and are able to balance different sources of information.

(Compiled from Marris et al. 2001)

On this background Marris et al. argue that "the possible solutions to the crisis surrounding GM agriculture and foods in Europe lie in substantially changed policy commitments as practice, rather than only (as is often conventionally implied) in "modes of risk communication" and "form of representation"" (ibid: 91).

Marris et al. have in my opinion uncovered an important element in understanding the roots of the controversies over GMOs with their argument that these do not spring from the fact the public are ignorant about GMOs and ideologically prejudiced against promoters and regulators, but that a number of policy actors seem to operate with overtly simplis-

tic or flawed conceptions of the public. This is a sophisticated type of social scientific criticism, showing that both business interests and regulators are at odds with the public they are either meant to, respectively, make their money from or protect. However, two provisos seem to be required here. 'Public perceptions' are to some extent artifacts of social research (re)constructions of (perhaps latent) dynamics underlying the controversies. These perceptions do not equal 'the controversies' as they unfold in a number of contexts. It is not until they are articulated *beyond* surveys and focus group research that they will have effects in the policy arenas. These effects are by no means certain to mirror 'public perceptions' directly as they will inevitably be filtered through a number of institutions. Secondly, Marris et al. to some extent 'invert' the deficit model, as they argue that commercial and regulatory organisations ought to align their modes of operations more closely with those of public perceptions. However, they only ask in a superficial manner *why* the stakeholders they investigated operate the way they do. They merely point out that their practices are problematic and perhaps aggravate controversy rather than mitigate it. As I shall argue in the following, a change of institutional practices may not be easy to achieve, as these practices are intimately connected to structural features of functionally differentiated modern societies. In Chapter III I shall examine the risk concept more closely with regard to its relation to social theory. There I will argue that it is more fruitful for sociological analysis to understand risk controversies as a matter of different modes of observations, rather than ascribing 'deficiencies' of one sort or another either on 'the public' or on other actors. Here I limit the discussion to some preliminary observations on why the risk frame is dominant or perhaps even hegemonic in the debates over genetic engineering, even though much research indicates that the public does not really perceive of the issues in such terms.

'Risk as Proxy' and the Evolution of Biotechnology Regulation

Modern, liberal societies have developed (on) the normative assumption that there is (and should be) a private domain where entrepreneurial activity is allowed without interference from the state, as long as its activities do not impose direct physical risks or unwarranted inconvenience on others, thereby preventing them from pursuing their activities likewise (van den Daele 1993, Saretzki 2000). A central precondition of this principle is that gains and losses befall the persons and groups taking the risk. This assumption has obviously become obsolete in many respects in the light of present day technologies, which can be characterised exactly by the fact that their risks and benefits often do not (necessarily) coincide socially or temporally (Luhmann 1991, Bonß 1995). The emerging acknowledgement of this problem, however, has not (yet) led to the development of general solutions in terms of consensually accepted social mechanisms for managing risks, as indicated, for instance, by discussions on the 'Risk Society', and by the difficulties in operationalising the 'precautionary principle' (Stirling 1999, Majone 2003).

In order to prevent too many of the risks and dangers falling on others, the regulation of technology is considered a legitimate and necessary task for the state and has been considered so for quite some time (van den Daele 1993). Hence, nowadays practically all technological activities are regulated at some level. Nonetheless, the basic principle generally remains in force that something must be proven to pose physical dangers to others for it to be prohibited prospectively. According to modern constitutions innovation cannot normally be arrested on the grounds that it could have potentially adverse social effects for certain groups (e.g. loss of income, unemployment) or that it conflicts with culturally dominant or 'desirable' ways of life (family farming, small scale production). If such effects are subsequently observed, they are most likely compensated in other ways as technical structures and artifacts, once they are implemented, are very difficult to reverse (cars being a classic example).

Obviously there are all sorts of exceptions from and restrictive interpretations of this liberal principle where potential innovations are perceived to contradict widely shared social values or legally codified norms (obvious examples: human cloning, and (at least in Europe) the spread of hand guns). More interestingly for the present purpose, interpretations may also vary temporally and spatially: The freedom to innovate and market GMOs is for instance clearly interpreted differently in the EU and in the US, just as the GMO regulation has evolved over time, partly as a response to controversy (Levidow and Marris 2001). However, it seems that within the regulation of agricultural biotechnology too the basic principle holds that if something does not pose any physical harm to human health or the environment, then it should be allowed – even if it is considered 'unnatural', undesirable or unnecessary by some substantial part, and perhaps the majority of a population. Innovations do not require justification through consensually agreed desirability or needs (Saretzki 2000: 43). The social mechanism foreseen to regulate or accommodate such cultural or social objections is the market, as it is assumed that if innovations are at odds with cultural values they will not survive on the market. To the extent that risks are seen as causally identifiable, adverse physical effects, science remains the social institution responsible for their evaluation.

As such, there are 'ideological' as well as ingrown institutional routines that explain why the risk frame remains a pivotal point in the controversies (as well as clear interests on the side of dominant actors). Therefore, questions of risk often seem to function as proxy for a number of concerns and objections, which are not strictly or exclusively risk related, but are more easily politicised if they can be associated discursively to physical risks or uncertainties (lack of knowledge/predictability) of one kind or another.

However, it is obvious that the biotechnological domain is one of the areas where the liberal principle of freedom of innovation is challenged and its limits tested in controversial manners. One indication of this is that modern biotechnology was the first major technological programme that, from the outset, saw a shift from a 'retrospective' to a 'prospective'

approach to regulation, i.e. a shift from prevention of known and observed adverse effects to precaution against hypothetical risks (Gill 1998). This was connected to the then emerging environmental consciousness and an acknowledgement that precaution is preferable to cure. Retrospective prevention is based on actual experiences of adverse effects of activities where an identification of causation is applied *ex post*. Prospective precaution, on the other hand, takes place *ex ante* from hypotheses about what could possibly go wrong, but where no experiences provide data for assessments because the effect to prevent has not occurred. This makes the horizon of potential effects much wider, as it is necessary to search not only for causes of observed effects, but guard against effects whose causal paths are (perhaps) only hypothetical (ibid).[19] This raises significant cognitive challenges, as *potential* damage must be assessed. However, it also poses normative challenges as how such potential effects should be evaluated (and if the time horizon is long then also whether changes of values can be expected to emerge that will change the basis of assessment must also be pondered).

As effects are unknown, 'traditional' environmental regulatory principles that regulate the distinction between what is legal and illegal on the basis of limit values (which are to some extent fictitious)[20], i.e. in principle independently of whether damages occur, become obsolete:

> *"Da man also die Gentechnologie nicht gleich verbieten oder nur bereits bekannte Risiken berücksichten wollte, sondern eine prospektive Vorsorgestrategie gewählt hat, muss das bisher übliche Verfahren des 'als ob'[21] hier sowohl aus kognitiven wie aus normativen Gründen versagen. Das bedeutet zugleich auch, dass die rechtlich bisher übliche Abschichtung zwischen vorsorgepflichtigen Gefahren und zu vernachlässigendem, weil ausgesprochen unwahrscheinlichem Restrisiko inkonsistent wird. Denn bei dieser Abschichtung wird unterstellt, dass das Risiko prinzipiell bekannt und – nach der Formel von Schadensumfang und Eintrittswahrscheinlichkeit – berechenbar ist. Davon kann aber bei einer Öffnung des Erwartungshorizonts und bei neuen Technologien, mit denen man nur ungenügenden Erfahrungen gesammelt hat, gerade nicht mehr ausgegangen werden."* (Gill 1998: 32-33)

This opening of normative questions through the emergence of new risks is one of the reasons that biotechnology has proven so controversial. Historically, it can be observed that it was precisely the communication of hypothetical risks that initiated the regulatory concern with biotechnology and contributed to its controversial trajectory. Struggles over the management of biotechnology originate before public concerns were an important issue (or at

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[19] Which leads to the 'warning paradox'. We do not know if precaution is required, and if attention is paid to warnings, we might never know if they were required or not.

[20] 'Fictitious' in the sense that they legally regulate something based on scientific procedures that are conventions rather than established facts or fully understood causal mechanisms: "Mit ihrer Verankerung in Verwaltungsvorschriften wird aber die Fiktion durchgesetzt, *als ob* Emissionen oder Immissionen unterhalb der Grenzwerte ungefährlich seien. Mit der Konstruktion dieses zweifachen 'als ob' wird Ungewissheit in verwaltungspraktisch handhabbare Gewissheit überführt" (Gill 1998: 32).

[21] See previous footnote.

least clearly before public perceptions were measured). Hence, public concerns were not the initial cause of the controversies, even if it can be argued that today they are a significant reason for their continuance. Initially, the controversies were played out in more specialised 'publics', notably the scientific community. They then gradually spread out to other domains of society, as will be briefly recounted in the remainder of this chapter.

At the start of what was later to be considered a biotechnological revolution, when trans-genetic research was in its infancy, concerns expressed were exclusively about physical risks, and manifested themselves as 'whistle blowing' within the scientific community. After the first *in vitro* transfer of a gene across species was undertaken in 1973, concerns emerged that such work could produce risks that were not well understood. In what is now often mentioned as the first attempt by the scientific community to self-impose restrictions on its activities, a temporary moratorium on trans-genetic research was agreed upon, until an international conference could discuss the potential dangers to laboratory workers and the environment in the case of escaped organisms. Eight months later in 1974 the now renowned Asilomar conference was held, where the scientific community involved in this research came to the conclusion that initial fears were largely unfounded (Gottweis 1998). The scientific community appreciated that there was great potential in this research field, but that this could only be realised if some controls were put in place to prevent mishaps and to ensure the legitimacy of the research. It was hence at the request of the scientific community that the American National Institutes of Health (NIH) in 1976 issued guidelines for trans-genetic research. The NIH guidelines were subsequently adopted more or less directly by most European countries, and in the initial phases interpretation and oversight was left to the scientific community itself (Torgersen et al. 2002: 29-31).

As such, biotechnology was from its very inception associated with potential risks and regulation prospectively organised, as it was not known what damages could be expected – but experiences from other domains and theoretical conjectures indicated that precaution was required. Although the scientific mainstream gradually moved towards considering the risks entailed as manageable and as not posing problems qualitatively different from other research or principally different from other technologies, dissenting voices within the molecular biological community persisted. As technological applications gradually emerged, concerns were also raised from neighboring scientific fields such as ecology and medicine. Here, the focus was on the suspected synergistic effects of trans-genetic organisms released into the environment and consumed by humans. The internal scientific controversies gradually polarised along the pro/contra lines and as such contributed to the emerging public concerns.

> *"... (I)n the struggles over biotechnology, scientific expertise of two different kinds was deployed, either denying the possibility of hazards or emphasizing uncertainty and risks. This contributed to the bewildering array of laypeople and politicians who demanded 'impartial' expertise from the science,*

since for most of them it was inconceivable that there was more than one version of 'objective' truth. Ultimately, this would contribute to the erosion of trust in scientific advice." (Torgersen et al. 2002: 40)

These internal scientific community discussions about cognitive uncertainties and the manageability of complex processes thus gradually spilled into other societal domains such as politics, economics, law and the media where the polarising effects were often reiterated in new ways. The fact that the controversies can 'travel' in different communicative domains is of course part their dynamic, and makes it difficult to capture them, as they will never adhere to just one argumentative logic. In the following chapters I shall attempt to dig deeper into what that means with the help of sociological theory. Before moving on I will briefly describe some aspects of the regulatory challenges arising from the introduction of biotechnology and the issuing controversies.

In a recent review of public debates about and regulation of the biotechnology in Europe, Torgersen et al. (2002) claim that the history of biotechnology appears "... at first glance, an odd and almost impenetrable jungle of rhetoric and facts, policies and interests, opportunities and risks, wishes and fears, attitudes and world views..." (ibid: 24). It is not possible to convey a full discussion of this in a few pages, especially since these show significant variation across national contexts in substantive, social and temporal terms. Some general issues are however worth introducing as a prelude to the theoretical discussion to follow.

In the US, the scientific community, who initiated the concerns about trans-genetic research, largely managed to close down the debates by assuring the public that further research and safety guidelines rendered the risks manageable. The appropriation of (agricultural) biotechnology has therefore proven relatively uncontroversial in that country. In Europe, the debates proliferated and the introduction of the technology followed a very different trajectory.

If one assumes that regulation of technology should serve two functions, namely prevention of accidents and adverse effects as well as the creation and maintenance of public acceptance (Hasse and Gill 1994: 265), then the second function has clearly failed in several European countries. Gradually, especially environmental organisations began to perceive biotechnology as replete with risks as well as morally charged. Therefore, it could also be used as a vehicle to politicise broader aspects of the techno-scientific development of modern societies. Parallel to the discussions about whether significant risks existed or not, the expectations of potential technological applications of this new research domain grew fast. Biotechnology was announced as the new 'technology of the future', possibly even more revolutionary than ICT. Therefore, the political systems in the countries with the most advanced knowledge bases began a dual process of working to ensure safety and public acceptance as well as to promote scientific research and technological development. Al-

though regulation was shaped differently in different European countries, in general it involved a development where self-governance by scientific communities was replaced by larger political involvement and oversight (Torgersen et al. 2002). In this process the scientific communities, and increasingly industry interests, sought to restrict this involvement to strict risk based evaluations, whereas opponents increasingly brought in demands of socio-economic and ethical assessments along with demands for more protection against risks to human health and the environment.

As some sceptics believed that genetic engineering inherently entailed qualitatively new processes they argued that a precondition for its acceptance should be that it could be proved these entailed no risks. This was rejected by the promoters as an illogical standpoint, as the non-existence of something could not be proved, and new technologies always entailed a potential for surprises. Contentions therefore often centred on whether the potential for 'surprises', especially adverse effects, were significantly greater for genetic engineering than for other (agricultural) technologies.

In the issuing policy formation a number of principles had to be established with regard to what types of regulations were necessary and desirable. On a basic level, one can differentiate between horizontal and vertical approaches to GM regulation. In some countries a horizontal approach was opted for, where all applications of GMOs were regulated within the same legal framework spanning different sectors. In other cases vertical approaches were adapted, where biotechnology was incorporated into existing sector-based regulation depending on the type of application. Whether implicitly or explicitly within these decisions lie the political and regulatory perceptions – often outcomes of definitional struggles in the respective policy arenas – of whether genetic engineering is something qualitatively new or whether it should be seen as just the refinement of existing technologies. A horizontal approach with specific 'gene-laws' indicates that genetic engineering is given a special status, and obviously invites more politicisation than if the regulation spreads over a number of existing regulations with no distinct locus.

Another general distinction pertaining more to the substance of regulation, which in my opinion captures (some of) these issues quite well, has been suggested by Jasanoff (1995). She distinguishes between regulatory approaches based on products, process and programme. Regulation based on products is in principle indifferent to whether genetic engineering has been applied or not, as the object of regulation is the characteristics of the product that emerges. In this approach GM food, for example, should only be treated differently from other foodstuff if it has different nutritional characteristics. In a process based regulatory regime, the process by which products are produced become the object of regulation. Hence, GM food is considered special independently of whether its nutritional

characteristics are different from conventional food exactly because it is produced using genetic engineering. In a programmatic regulatory approach, a whole technological regime as such is taken into consideration and concerns beyond technical characteristics such as socio-economic impacts are observed when applications are assessed.

The categories of product, process and programme based regulation are of course idealisations. However, Jasanoff argues that, roughly speaking, the US primarily ascribes to a product-based approach, whilst before EU harmonisation the UK opted for a process based approach to GMOs, whereas Germany experienced a more programmatic debate about the wider perspectives and consequences of genetic engineering flowing into regulatory initiatives.[22] Depending on what regulatory style is opted for, different issues become the proper objects of regulation and the role of science vis-à-vis other types of competences differs. Not only were different regulatory approaches chosen in different European countries, but different social configurations of the policy arenas could be observed. Torgersen et al. distinguish four different configurations shaping regulation (as well as where they were 'typical'), namely: 1) exclusive or elite decision-making (France/UK), 2) co-optation (NL/Sweden, to some extent Germany), 3) public participation (Denmark) and 4) delegation to the European level (mostly southern countries). (Torgersen et al. 2002: 42).

The fact that the political systems often assumed a dual role as promoter/supporter and regulator of biotechnology has according to some observers contributed to a decline in public trust in the willingness of regulators to ensure adequate risk protection. "Obviously, governments thought that biotechnology was something worth developing and they supported it with alacrity. Yet they also styled themselves as impartial regulators of what many perceived to be a risky endeavour. This ambiguity later proved to be one of the sources of public distrust." (ibid: 23).

While many of the initial controversies were played out separately in different national context throughout the 1980s, the EC also developed an interest in biotechnology as an area of

[22] To take an example: If one observes the recent debates in the EU about the labelling of GM food through these concepts, traits from all the three modes can be found in the controversies. The promoters of GMOs clearly favour a product-based regulatory regime. This entails that labelling is only required when there are measurable differences in the physio-sanitary characteristics of products compared to conventional ones. They have argued that labelling of products that are 'substantially equivalent' in terms of nutritional characteristics would be unfairly stigmatised by carrying labels. The opponents of genetic engineering would like to base regulation on programmatic aspects of the technology and also required are labelling of products where GMOs were used in the process, even if they were not traceable in the end products, e.g. meat from livestock fed on fodder containing GMOs. This way, they argued, consumers can make an informed choice not only about whether or not they want to eat GMOs, but also whether or not they wish to support this technological trajectory in general. The regulatory paradigm that has been adapted by the EU can be described as process-based. Labelling requirements are determined by the use of genetic engineering somewhere in production. However, only food with actual measurable traces of GMOs must be labelled and no socio-economic criteria were admitted into approval procedures, which are envisioned in principle to be strictly risk based.

potential economic growth, which needed nurturing and 'protection' from the kind of conflicts that had marred nuclear power in a number of European countries.

In 1990 the EC issued a directive (90/220) on the contained use and deliberate release of GMOs, which intended to harmonise regulation across Europe. This was meant as a proactive move to regulate a number of activities, which were still only in their infancy, but were believed to become important in the following years, such as GM crops. The directive took a 'horizontal approach' and was as such process-based. However, although socio-economic and ethical concerns had become still more central in the concerns expressed in the public debates about biotechnology in the agricultural domain in several national contexts, these did not find their way into regulatory principles on the European level. Instead, public concerns were responded to by stressing the management of uncertainty and adapting a precautionary approach:[23]

> *"The directives were definitely not enacted on the basis of proven risks from the methods of genetic engineering; rather, the rationale was to use discretion until more experience was gained and regulation could be relaxed. By emphasising uncertainty, this regulatory solution tried to force together two apparently incongruent approaches to risk assessment, namely one that built on scientific evidence ex post, and one that built on scenarios of hypothetical risks ex ante."* (Torgersen et al. 2002: 49)[24]

The adaptation of a common European framework not only created problems internationally, it did not seem to fulfil its purpose internally in the EU. In part because the previously existing national regulatory regimes were not entirely adapted to it and different interpretations emerged in the implementation which carried on the different 'policy styles' mentioned above (Togersen et al. 2002: 60), and partly because it did not succeed in closing off the controversies, but actually multiplied the number of places where decisions could be contested (Dreyer and Gill 2000). It did however change the policy arenas, and in the period following its issue calmed the controversies to the initial advantage of the promoters.

During the 1980s both promoters and opponents of the technology had organised themselves in the national policy arenas. Among the opponents environmental movements were especially active in the public spheres, arguing that genetic engineering was inherently risky, that it entailed uncertainties that could not be managed and that it represented an undesirable socio-technical trajectory.

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[23] In part of course because policy makers perceived public concerns as being primarily about physical risks, but also because this was the most convenient way to regulate according to existing (technocratic) routines.

[24] This response to public concerns, where one could argue that risk and uncertainty are used as proxies for wider socio-economic, cultural and ethical concerns (i.e. if concerns of whatever character were expressed, reference to risk assessment is made and approval procedures are perhaps made tighter), was later to bring the EU into conflict with the US. Here a central bone of contention was whether regulation was or should be based on 'sound science', i.e. that restrictions on genetic engineering could only be imposed where there was evidence that risks to human health or the environment existed, or whether as-yet-unproven suspicions (hypothetical risks) should be seen as legitimate reasons to withhold the use of GMOs. This later proved to be a central issue in a looming trade war between the EU and the US, which impinged significantly on the behaviour of the EU institutions (Levidow 2001, Levidow and Marris 2001).

However, when regulation was transferred to the EU level, opponents generally needed more time to re-organise their activities in Brussels than the industry actors, who had considerably more economic resources available. Therefore, most observers agree, the promoters of biotechnology had more success in influencing European regulation during the first half of the 1990s. At this time many of the controversies of the 1980s disappeared from the policy arenas and many actors considered the most important issues as settled. It was believed by many that 'the cultural lag' had been closed.

This picture, however, changed radically when the first commercial GM products arrived large scale in Europe in 1996.[25] The introduction of crops from herbicide tolerant soy, however, was accompanied by the public perception that its owner Monsanto (a large agrochemical corporation) was trying to muscle its products onto the European markets against the will of consumers (Lassen et al. 2002, Dreyer and Gill 2000). Furthermore, this was preceded by a few months by the announcement by the British authorities of a connection between BSE (mad cow disease) and the human variant of Creutzfeldt-Jakob's Disease, which had eroded much of the confidence in food safety assurances by experts. Hence, consumer safety and freedom of choice was placed high on the public agenda. Opponents of biotechnology managed to create a symbolic link between BSE and GMOs by arguing that they were both instances of modern, industrialized agricultural practices and economic cynicism in the food industry. Hence, it was not impossible that similar adverse health effects could emerge from GM food, even if experts could not at that time establish such effects.

This reopening of the GM controversies and renewed public mobilisation after a period of calm had a number of effects, among others that issues of consumer safety moved to the centre of public attention and environmental organisations were joined by consumer organisations in the campaign against GMOs. During this process the boundaries between cognitive discussions about the safety of GMOs and broader socio-economic, cultural and ethical issues were more or less erased from public debates (Marris et al. 2001). However, in policy discourses, where public acceptance was increasingly acknowledged as *the* obstacle inhibiting the full potential of biotechnology, public concerns – to the extent that they could not be responded to by means of risk regulation – were increasingly perceived of as 'ethical' (Levidow and Carr 1997). Such 'ethical' concerns were on the one hand thematised as something distinct from risk issues in order to downplay the value judgements inherently entailed in risk assessments, and, on the other hand, responded to by a professionalisation of ethical competences in advisory groups etc. (Wynne 2001b).

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[25] Before this, a genetically modified tomato paste had been introduced in the UK without attracting much attention although it was labelled as 'genetically modified'.

Due to a number of alleged uncertainties and persistent public controversy, five EU member states pushed through a moratorium of further product approvals for both the deliberate release and the marketing of GMOs. Despite the fact that the responsible EU scientific committees would not sustain the assessments motivating the moratorium, it was extended in 1999 pending the approval of three new directives on the deliberate release of GMOs, and the labelling and traceability of GM material as well as liability. These directives proved politically very difficult to negotiate and the moratorium stayed in effect until May 2004 when approvals were slowly resumed. The moratorium had no legal base in the EU treaties and was ardently criticised by some scientists, the industry and the US, who considered it primarily as a technical trade barrier. Nonetheless, it was upheld for six years, as it did not seem politically desirable to lift it in the light of public controversies.[26] During the process the ability of scientific knowledge to manage risks, the appropriate use of science and expertise vis-à-vis politics and the legitimacy and independence of science from industry was the object of multifarious public controversies.

In joining the fight for tighter safety approvals consumer organisations also made freedom of choice for consumers an essential requirement of acceptance. Therefore, labelling became a central bone of contention in the renewed controversies. Promoters argued that this would stigmatise GM food unnecessarily, as they required safety approvals anyway. However, as the public unpopularity of biotechnology appeared to persist, the industry hesitantly caved in to this demand. In the shaping of the renewed EU directives labelling was made a central principle in the introduction of GM products in Europe.

By most observers this was an indication that the GM sceptics had managed to maintain animosity against agricultural biotechnology among the European publics and exert significant influence on regulation. However, the focus on labelling as a response to public concerns and controversies also signals an important conditioning of the publics' access to influence technological trajectories. The emergence of an additional frame of the public emphasising 'consumer' rather than 'citizens' aspects meant that evaluations of biotechnology have to some extent been transferred from a domain of collective deliberation to a 'privatised' domain where individual consumer preferences are decisive. Some observers pose this as a democratic problem, as what they perceive to be a matter of collective choices has been privatised, and technological development is to a still lesser degree held accountable by democratic institutions. The partial transfer of regulatory mechanisms to the market also meant that new lines of controversy opened up, namely over who should carry the costs of separation between GM and non-GM food. This is manifested for instance in struggles

[26] Notably, the five countries that instigated the moratorium (Denmark, France, Greece, Italy, Luxemburg) were also the ones with the lowest support rates in the EuroBarometer surveys (Gaskell et al. 2003). Although a direct causal relation demands more investigation, this does seem to indicate a sensitivity to public opinion, possibly mediated through survey research.

over threshold values for the adventitious presence of GM material in non-GM crops and food from pollen-drift and contamination in the production chain.[27]

In this chapter I have tried to establish in a general manner the contours of the controversies over (agricultural) biotechnology by discussing a number of issues relating to their social, substantial and temporal dimensions. Of course, what I term 'the controversies' is a conglomerate of sometimes very loosely connected communicative processes, and not a coherent whole. The totality of this cannot be adequately traced or summarised in these few pages. I hope, however, that this descriptive introduction to the material subject of the thesis will provide the reader with a better understanding of the object of the theoretical discussions to be taken up in the following chapters. In the next chapter the task will be to discuss different diagnoses of and suggested remedies for the challenges posed by the intermingling of cognitive, cultural or ethical and socio-economic elements in such controversies.

[27] The lower the values set for acceptable contamination, the higher the costs of enforcing separation. The GM sceptics argue that it should be the producers of GM crops that should carry these costs, the promoters that if there is a market for non-GM crops, this will be established in the willingness to pay a price premium for non-GM crops. As will be expounded during the case studies, this is one of the areas where differing problem framings clash in ways that can neither be kept within the bounds of scientific problem solving, nor settled by the market without regulatory intervention that must necessarily be based on normative standards of some kind.

Chapter II

New Discourses of Public Involvement

The kind of controversies over biotechnology outlined in the first chapter have, along with others controversies over the management of technological risk and the general steering of technological trajectories, led to countless observations that something has changed and is changing in the relationship between science, technology and wider society. This is often accompanied by observations and diagnoses of heightened and altered problem-awareness among innovators, regulators and citizens alike. As a consequence, processes of social learning are claimed to take place, and advocated by observers from different quarters. This, I contend, has had some impact on how modern societies observe and respond to technological controversies as shall be explored in the following.

Some of these observations can be summarised as analyses of and pleas for increased public involvement in the governance of science and technology with the aim of establishing 'better' decision-making thorough procedures that could democratise technology, mitigate controversy and (re)create public trust in expertise. These observations I initially called participatory and deliberative 'postulates'. Such ideas have increasingly gained the attention of policy-makers confused by the declining popular acceptance and legitimacy of a number of science based technological innovations and activities, as well as what is often seen observed as an unchecked proliferation of technological risks. Discourses on participation and deliberation do not represent a unitary or coherent theoretical or methodological set of approaches, they are rather a spectrum of ideas on how to manage the interface between scientific and technological dynamics and the rest of society.[28] These participatory and deliberative postulates often combine an analysis and diagnosis of controversies with advocacy for new and allegedly more democratic ways of doing things. They descriptively argue that changes have occurred in the way modern societies produce and manage both knowledge and risk in relation to technological dynamics, which necessitates new forms of public engagement in order to ensure legitimacy and public trust. Normatively, they argue that such procedures are desirable as a means of expanding democracy into domains where it has so far had less trenchancy. Although demands for increased public involvement often encoun-

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[28] This evaluation – and from the perspective of constructing a research framework; challenge – is shared by the, to my knowledge, most comprehensive, comparative study of participatory technology assessment to date (Joss and Bellucci 2002):

"*The issues of both participation and TA are conceptually and practically so far-reaching that it proves rather difficult to consider them on the basis of just one kind of theory. In fact, looking at the rich literature on TA and pTA, it is clear that a range of different schools of thought – including systems analysis, policy science, democratic theory, sociology of scientific knowledge, communication theory – can claim to have substantially contributed to the development in this field, even if they have arrived at contradictory claims. Therefore, a theoretical framework should consider, as far as possible, various schools of thought concurrently.*" (Bellucci et al. 2002: 17).

ter significant institutional resistance (Wynne 2001b), academic observers and many practitioners tend to perceive them with a sort of 'fatalistic optimism': There is no alternative to transparency and dialogue between 'science' and 'the public' (e.g. Durant 1999).[29]

The aim of this chapter will be to explain important strands of these diagnoses and normative claims, which, following my assumptions, have inspired attempts to operationalise public involvement and provided central elements of organisations' self-descriptions of such procedures.

In the following I shall seek to unfold different thematic focal points in the discussion on public participation and deliberation. This should serve, in the first instance, to clarify central elements of what I will call the intellectual underpinnings of calls for and experiments with new modes of addressing technological controversies. Despite differences in origin between some of the ideas and discourses to be discussed in the following, their common denominator is that they suggest that social integration in the face of technological controversies can – and hence ought to – be (re)established and maintained by means of expanded *inclusion* in some form or another. It is argued that substantial rationality *and* social justice can be mutually strengthened through a proceduralisation of technological controversies that broadens the scope of perspectives and interests considered. Such calls for inclusion place emphasis either on persons or groups (increased participation) or on 'standpoint perspectives' or arguments (increased deliberation) although this distinction is more analytical than is important at the operational level, as persons/groups and arguments are usually perceived as closely connected in social reality.

Challenges to the Technocratic Model – The Emergence of Technology Assessment

Although it is rarely spelled out in detail what exactly it is that these alleged new forms of public engagement distinguish themselves from, this can be reconstructed from the arguments as an ideal-typical 'traditional' approach of discretionary, technocratic policy making. 'Traditionally', in that at least in the period since the Second World War until the rise of the environmental problematique on the public agenda, policy making in the science and technology domain has allegedly been dominated by technocratic elites and based on mostly uncontested assumptions about the nature of scientific knowledge, technological dynamics and a value consensus in regard to these.[30] Among the assumptions were that scientific and

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[29] Formulated slightly differently, but essentially arguing the same point: *"Zu einer diskursiven Klärung von durch Wissenschaft und Technik aufgeworfenen Fragen des "gemeinsamen Guten" scheint es in post-traditionalen Gesellschaften keine (demokratische) Alternative zu geben."* (Hennen 1997: 197).

[30] In some respects this of course goes back a lot further. In the present context the dating of the beginning of the alleged dominance of technocratic forms of governance is of less interest. However, the Second World War in some respects catalysed a transformation of knowledge production and management that laid the ground for what is now claimed to change (e.g. Gibbons 1999).

technological progress was equated with social or human progress, and that scientific knowledge was rationally superior to other ways of ordering experiences and guiding action. The possession of rationally certified, and hence superior, knowledge was socially ascribed to scientists (or people with science-based qualifications), who in effect held the monopoly on managing and regulating science and technology to the benefit of all of society. As scientific and technological knowledge is highly esoteric, it was perceived more or less as a matter of course that it should and could be governed only by competent expert communities, which were self-recruiting and self-policing. Hence, lay people (ordinary citizens) were effectively excluded from active participation in such policy-making. Expert communities (public or private depending on the domain) would normally set goals, distribute resources and define what was to be perceived as dangerous or undesirable for the broader population.[31]

It was of course recognised in principle that the setting of goals was a political and normative task, which needed democratic legitimacy. This was ensured through the formal attachment of regulatory and policy-making bodies to representative institutions, where technocratic elites were perceived to function as neutral advisors to politicians, who in the final instance were in control. However, due to the complicated and technical nature of the issues, in most instances expert bodies had significant discretionary power at the operational level. Sometimes this is described as an implicit contract between science and society: in return for granting science significant autonomy and providing it with resources, society would in return receive beneficial technological innovations and the preconditions for economic growth.[32]

With the advent of ecological crises and technological controversies a number of the assumptions underpinning this traditional model of science and technology governance have proven problematic and fallen into disrepute.[33] Many reasons and processes have been suggested as to why and how this has happened, but it is difficult to make out any general convergence of the sociological diagnoses. Therefore, modifications and alternatives are being suggested and debated on different fronts. The various calls and suggestions for par-

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[31] This is obviously highly simplified, as research on different national configurations of the use of expertise indicates (e.g. Jasanoff 1995, Renn 1995). As a contrast to the arguments in favour of increased public involvement, however, this kind of generalised image is often invoked.

[32] Consider for instance the widely quoted argument by Gibbons published in *Nature* claiming that "... there has been a social contract between science and society, an arrangement built on trust which sets out the expectations of the one held by the other, and which – in principle – includes appropriate sanctions if these expectations are not met." (Gibbons 1999: c81). And a little later: "A new social contract is now required. This cannot be achieved merely by patching up the existing framework. A fresh approach – virtually a complete 'rethinking' of science's relationship with the rest of society – is needed." (ibid).

[33] "*Die Vorstellung eines determinierten Zusammenhanges von technischem und gesellschaftlichem Fortschritt – mit der letztlich eine Depolitisierung technologischer Fragen verbunden war – ist vor dem Hintergrund ubiquitärer Risiko- und Folgendebatten, wie auch der allgemein gestellten Forderung nach politischer Gestaltung des technischen Wandels auch von den wissenschaftlich-technischen Eliten kaum noch aufrechtzuerhalten.*" (Hennen 1997: 193).

ticipatory and deliberative procedures can be seen as one indication of this. These calls are not emerging from a single source or a coherent mode of observation, as it will be shown in the following. However, before I present a classificatory scheme to order some of these new ideas and go on to discuss some of their underlying assumptions, I would like to insert a brief description of how technology assessment (TA) has evolved since the 1970ties and been institutionalised as a set of policy tools to mitigate adverse social and ecological consequences of technological dynamics. Although the arguments in favour of increased public participation and deliberation of course go way beyond the conceptual debates on TA, these debates can be seen as symptomatic of some of the larger institutional challenges posed to modern societies by technological dynamics and the proliferation of risks.

In part as a consequence of an emerging recognition that an unchecked technological dynamic had adverse social and ecological effects, but also more generally that science and its technological applications posed increasingly complex demands on political systems, cognitive resources were increasingly built up in political systems across the western world. The guiding idea was to advise political decision makers on the impact of technologies on society, as a number of experiences had made it clear that the adverse impacts of technology – unwanted side-effects of what were otherwise seen as desirable developments – should preferably be dealt with prospectively and proactively rather than reactively. This led to discussions of how to establish reliable technology assessments. Initially, the main trend was to *expertise democracy* by equipping decision-makers more systematically with certified expert knowledge. This development is epitomised by the creation in 1972 of the US congressional Office of Technology Assessment (OTA), which was subsequently copied in different forms in a number of Western countries. The initial work of the OTA and more generally the methodological discussions on TA were characterised by great optimism with regard to the ability to mitigate adverse effects through a higher content of scientific knowledge in political decision-making. With an intellectual inheritance going back to Ogburn's cultural-lag thesis, TA activities were perceived to be expert endeavours, which consisted primarily in forecasting autonomous technological dynamics and 'preparing' other sectors of society through proactive measures, thereby mitigating the effects of emerging technologies. Eventually, in light of the difficulties incurred in predicting technological trajectories with sufficient precision as well as a growing recognition that this kind of TA presupposed a value consensus, which was not present in modern societies, expectations of the efficacy of expert-TA declined and a search for methodologies better equipped to deal with differences in risk perception and acceptance as well as broader value diversity was initiated.[34] Some strands of the TA community continued to see the endeavour as a rational,

[34] This is of course a very compact description of a number of discursive and institutional developments, which cannot be recounted here. For more detailed accounts see among others Grunwald (2002) and Ropohl (1996).

scientific discipline, whose goal it was to deliver objective knowledge to political decision makers (as epitomized in the proverb 'speaking truth to power'), and enlighten the public on the technologies ever more pervasive in their everyday life. Others increasingly saw the task of TA to provide more holistic assessments of technological options, which could assist the broader polity in making collective choices. In this task certified and objective scientific knowledge of course played a central role, but it was increasingly acknowledged that many of the challenges modern society faced were of a 'trans-scientific' and value-laden character that could not be settled by scientific procedures alone, nor left to the discretion of a technocracy without democratic legitimacy. A development was envisioned where not only allegedly value neutral technical and economic aspects were to be assessed in more or less exact manners, but the perspectives of those 'affected' (stakeholders and citizens) were to be made integral to the assessments. This initiated the search for more participatory types of technology assessment (PTA), which would serve to *democratise expertise.*

The Intellectual Underpinnings of Participatory Technology Assessment

According to Webler and Renn (1995) one can basically distinguish between two types of arguments in favour of PTA procedures and increased public involvement in general: normative-ethical, and functional-analytical (see also Rowe and Frewer 2000). Normative approaches see participation and deliberation as desirable in themselves as they ideally facilitate collective reflection and empower the citizenry *vis-à-vis* technological dynamics, whereas the functional approaches are mostly concerned with the beneficial effects on society's ability to function without creating too many ecological or social externalities. In the first perspective technological controversies are 'disturbing' because they are the expression of concerns, fears and disagreements about how technologies affecting individuals or groups should be managed, whilst in the second they are disturbing because they are perceived to lower the functioning of and integration between the various subsystems of society and the capacity to innovate. In a functional perspective public involvement is seen to fulfil 'therapeutic' functions, such as helping (re)establish and maintain public confidence in the social institutions in charge of managing technology. I will argue, however, that in recent years a third strand of argumentation in favour of participatory procedures has emerged, which, to some extent, combines normative and functional considerations, but also opens up new perspectives. In these arguments the quality and validation of knowledge is made central. This triad of arguments is of course more analytical than empirical in the sense that such arguments often overlap. For instance, it is hardly possible to argue in favour of participatory procedures from a purely normative standpoint if it cannot be substantiated that it will at least potentially be able to produce beneficial outputs in terms of efficiency and decision rationality. Neither can serious claims be made (at least not publicly) for procedures of public involvement, which will only serve 'therapeutic' purposes in terms

of public acceptance if this takes the form of outright paternalistic manipulation of public opinion. I shall first explore these different arguments in the light of a classification suggested by Luigi Pellizzoni that indicates in some detail how the different types of arguments overlap. Subsequently I shall spell out in more detail some of the central intellectual elements and assumptions in the debates on PTA and increased public involvement in a wider sense.

According to Pellizzoni the discussions on PTA bring together intellectual traditions, problematics and modes of observation from at least three intellectual fields, which overlap in the contemporary discussions on PTA (Pellizoni 2003a). He also suggests a model to illustrate this that I find quite informative. Pellizioni claims that the debates on PTA feed on contributions from philosophy and the sociology of science, from social and political theory and from political science discussions on governance. These disciplines contribute, respectively, their perspectives on cognitive uncertainties (ignorance and indeterminacy), value incommensurability and complexity of governance. All of these overlap, but they also point out different challenges to PTA procedures and institutions. As this idea captures a number of issues to be addressed in the case studies, I shall expand somewhat on it.

According to Pellizzoni many contemporary technological controversies are grounded in and characterised by what he and others term 'radical uncertainty', which challenges traditional conceptions of scientific knowledge production, democracy and policy making. Radical uncertainty characterises "situations where not only the means but also the goals and structure of a problem are ill-defined" (Pellizzoni 2003b: 328). Radical uncertainty typically features in what have been termed 'intractable controversies' (Schön and Rein 1994), where different problem framings among the contestants mean that disagreements are practically unresolvable by means of argumentation or by recourse to empirical evidence, as "the parties in dispute tend to emphasize different facts, or give them different interpretations, so that each party seeks to confute the empirical evidence adduced by the others. There is no consensus either on the relevant knowledge or on the principles at stake. Facts and values overlap." (Pellizioni 2003b: 328). If one perceives PTA as "at the same time a new way of doing science and of democratically managing public matters" (Pellizzoni 2003a: 203), then radical uncertainty raises a number of challenges.

From the perspective of a constructionist sociology of science, the recognition that the distinction between facts and values is blurred in light of cognitive uncertainties potentially undermines the use of scientific knowledge as a commonly shared resource in technological controversies. It sharpens the ambivalence surrounding the use of scientific expertise in modern societies. On the one hand, modern societies make themselves increasingly dependent upon sophisticated science-based knowledge in countless contexts yet, on the other, confidence that science and scientific expertise can and will deliver the kind of competence required in impartial and disinterested ways is in decline. This makes scientific ex-

pertise's role in PTA precarious, as it becomes difficult to discern when experts act as neutral providers of cognitive resources and when they are better perceived as serving partisan interests.

From the perspective of social and political theory, PTA is often perceived as embodying the ideas and ideals of deliberative democracy, just as deliberative ideas are brought in to help 'operationalise' a perceived need for more dialogue. The deliberative ideals attempt to establish a normative alternative or complement to representative institutions by making the use of reasoned argument central to policy making. Central to deliberative ideals is that collective decisions should be reached only after an exchange of arguments that are non-exclusive both thematically and socially, i.e. all those affected by decisions should have the opportunity to contribute and no relevant viewpoints should be left unconsidered. As shall be discussed further below, many of the ideas about deliberative democracy are connected with the writings of Habermas. For Habermas these ideals originate in a theory of communicative rationality, which basically embodies a 'unity of reason' assumption, i.e. that cognitive, normative and expressive/aesthetic disagreements can all in principle be settled through argumentation. Distortions in such 'public' communication are primarily perceived as products of unequal distributions of resources and access to participation, which are (at least in principle) contingent. However, as Pellizzoni notes, many of the present technological controversies involving radical uncertainty appear to be characterised by *incommensurability*, which means that conflicting interests are often superimposed with fundamentally diverging value structures and worldviews (Pellizzoni 2003a: 208-09). Basically, this indicates that objectivity is positional (ibid: 210) and the idea of a 'unity of reason' proves to be an assumption that does not adequately mirror empirical reality. If such incommensurable worldviews are at the root of technological controversies, it is not feasible to expect that they may be settled through argumentation even under ideal circumstances.[35] Nonetheless, deliberative ideals appear to be informing much of the search for more inclusive forms of policy-making in the science and technology domain (Elam and Bertilsson 2003).

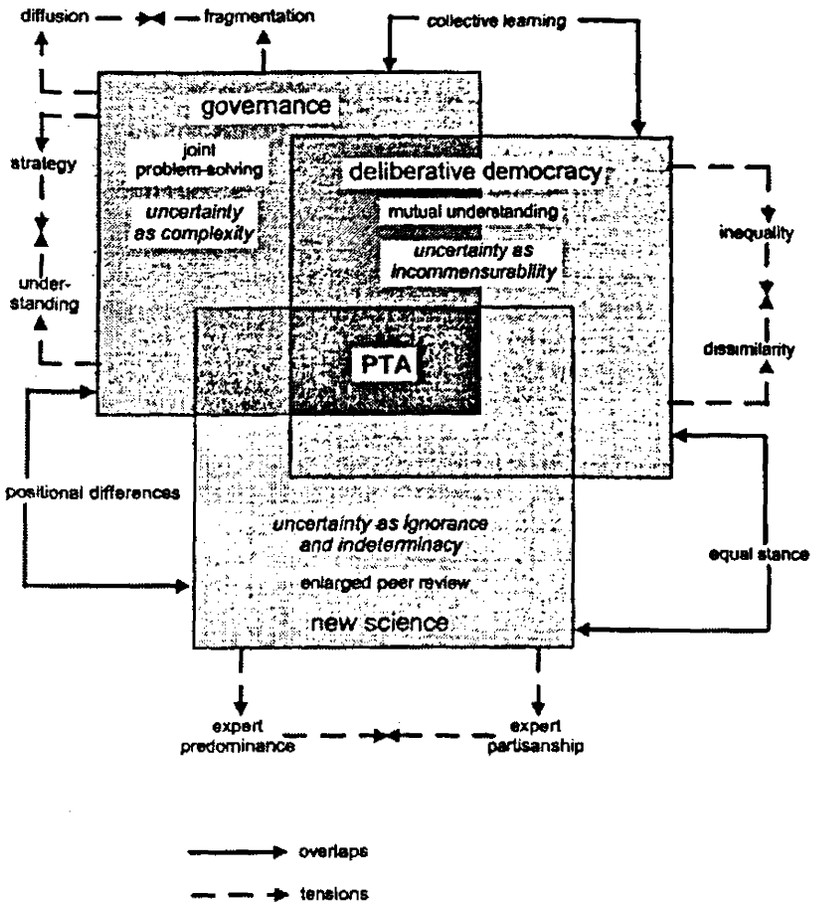
From the perspective of political science and the debates on governance, PTA is primarily looked upon as a means to manage complexity. In policy circles it is increasingly recognised that modern societies have become so complex that traditional hierarchical means of governing are no longer adequate. In domains such as risk regulation where market solutions are not tenable (either for cognitive or normative reasons) a growing delegation of regulation to more or less self-governed networks can be observed. PTA can be seen as one em-

[35] In such instances bargaining may be preferable also in a normative perspective, as it is more respectful of difference in some circumstances. The recourse to bargaining can signal respect of the adversary, where deliberation in case of incommensurability runs the risk of signalling a deficit of rationality to adversaries one does not agree with (Pellizzoni 2003a: 209). Bargaining or other non-argumentative means to settle disagreements can also be considered rational, i.e. supported by reasons, if it can be shown that no discursive consensus is possible due to incommensurable worldviews.

bodiment of this trend, where different stakeholders in technological controversies are encouraged to cooperate in working out shared problem definitions and reaching solutions without the direct intervention of central political institutions (governments and parliaments), whose function is transformed into that of the 'meta-regulator', monitoring and supervising self-regulatory processes (e.g. Willke 1996). In such cooperative forms a balance must be found between stakeholders' strategic behaviour and the willingness to consider general interests (Pellizzoni 2003a: 212). This perspective hints at two challenges for PTA. One is that network governance is a process based on cooperation between organisational actors, which potentially undermines democratic accountability, as the channels for manifesting popular discontent with performance of the involved organisations become fluid or unclear. Unclear accountability structures make maintenance of trust difficult. In addition to this, radical uncertainty can make it difficult for stakeholders to identify how their interests can best be pursued, and cooperative arrangements may be threatened by disintegration into (erratic) strategic behaviour (ibid.)

Pellizzoni argues that the discussions on PTA can be seen as a conglomerate of perspectives (of which the three I have just presented are the most important) and that the rise of 'radical uncertainty' poses challenges for all of these. However, Pellizzoni also argues that the different perspectives contain pairs of overlapping problematiques, which account for the mutual inspiration found between them in the discussions on PTA. For the sociology of science and the analysis of governance, the question of how to deal with the problem of positional differences (how to foster cooperation between mutually incongruent problem definitions and worldviews) is an area of common interest. For the deliberative democracy-perspective and the analysis of governance the challenge of fostering processes of collective learning provides another area of shared interest. Finally, the sociology of science and deliberative democracy faces a common challenge in establishing when and how the knowledge of different groups and organisations should be considered as equal and equally important and when some can legitimately claim superiority, that is what weight should be given to arguments and viewpoints of, respectively, lay people, stakeholders and scientists in what circumstances.

The overlaps between the different sources of the debates on PTA and their internal tensions due to challenges from radical uncertainty are illustrated in the following figure.



Source: Pellizzoni 2003a: 204

In my opinion this provides a useful overview of the different problem complexes and their interaction from which the calls for public participation and deliberation on the regulation of science and technology spring, as well as some of the challenges such procedures are faced with. In the following I shall go into more depth on some of the arguments and concepts drawn upon and developed in the debates about such procedures, and look at how their protagonists foresee them in practice.

New Modes of Knowledge Production – and the Role of 'the Public'

As mentioned above, a significant motive behind the calls for increased public involvement with science and technology policy making rests on the diagnosis that due to evolving problems with risks, scientific knowledge production and policy advice are undergoing sig-

nificant transformations both in terms of cognitive content and social organisation.[36] Some of these diagnoses and claims shall be introduced in more detail here. In the literature inspiring many of the calls for and analyses of participatory procedures, two strands of arguments can be made out. Both are occupied with the relationship between the production and validation of knowledge and the regulation of technology, but place different emphases on social configurations. The first set of arguments is concerned with the general transformation of scientific knowledge production in western societies, which has entailed new quality measures and social mechanisms to ensure the quality of knowledge. This allegedly impinges on the use of knowledge in the social regulation of controversial technologies in important ways. The second set of arguments is more concerned with 'other' forms of knowledge, partly how and why they are different from scientific knowledge, and partly how these are worthy, and could and should be incorporated into decision-making (i.e. they are considered not as a residual category of imperfectly understood scientific knowledge, but as a creative and valuable resource in their own right).

I shall first discuss two concepts suggesting a transformation in the production and validation of knowledge, which have been quite influential in recent discussions. The first is called *post-normal science*, and the second *Mode2 knowledge production*. Each highlight slightly different aspects of alleged changed configurations in the science/society interface.

Some of the claims put forward by the authors are fairly bold:

> *"Whereas science was previously understood as steadily advancing in the certainty of our knowledge and control of the natural world, now science is seen as coping with many uncertainties in policy issues of risk and the environment. In response, new styles of scientific activity are being developed. The reductionist, analytical worldview which divides systems into ever smaller elements, studied by ever more esoteric specialism, is being replaced by a systemic, synthetic and humanistic approach. The old dichotomies of facts and values, and of knowledge and ignorance, are being transcended."*
> (Funtowicz & Ravetz 1993: 739).

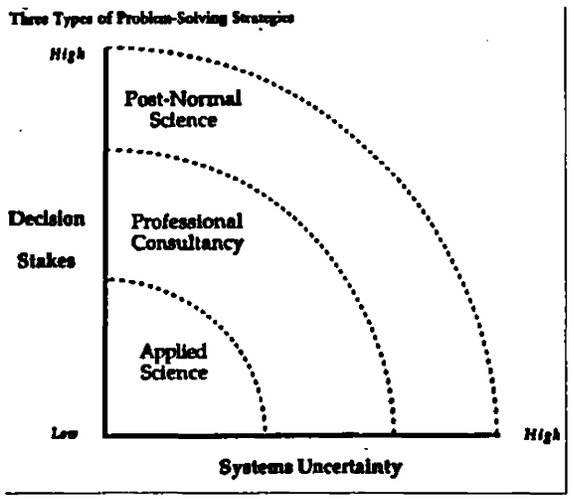
So far, the empirical substantiation of these claims must be considered as sparse (e.g. Weingart 1997). However, there are three reasons why I think they are worth discussing in some detail in this context. 1) Biotechnology is one of the areas in which the authors of these arguments claim a particular validity for their observations; 2) This way of thinking informs at least some of the initiatives of participatory procedures to be investigated; 3)

[36] The management of technological risks is not the only factor driving these alleged changes. For instance the commercialisation of research is also a significant trait. Here, however, I focus on the effects arising from the management of risk and uncertainty

The ideas and concepts seem to be increasingly embraced by policy makers and promoters of technology.[37]

According to Funtowicz and Ravetz, the concept of post-normal science is an attempt to devise an extended quality measure for scientific policy advice in conditions where "facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowicz & Ravetz 1993: 744). In such situations the quality of knowledge cannot be evaluated according to usual scientific standards. The quality of knowledge becomes a pragmatic relation where many aspects (environmental, social, ethical) must be taken into consideration in order to evaluate whether knowledge is adequate in a given situation.

The concept of post-normal science is part of a larger classification of expertise. Funtowicz and Ravetz use two attributes to describe situations where expertise is required for policy making: system uncertainties and decision stakes. System uncertainties have to do with the ability to understand, predict and manage a complex reality beyond scientific laboratories, while decision stakes have to do with "the various costs, benefits, and value commitments that are involved in the issues through the various stakeholders" (Funtowicz & Ravetz 1993: 744). The attributes are heuristics used both to classify various problems requiring expert knowledge or scientific advice, and to differentiate between three different types of knowledge-producing activities aimed at providing such policy advice: applied science, expert consultancy and post-normal science. Where both attributes are relatively low, applied science is an adequate tool to solve problems, but as either one or both attributes increases there is a move from applied science towards expert consultancy and then to post-normal science. This is illustrated graphically in the following way:



Source: Functowicz and Ravetz 1992: 254

[37] For instance, the concepts of 'extented peer review' and 'socially robust knowledge' introduced in these writings are both present in the EU Commission's White Paper on 'Democratising expertise', which advocates a substantial revision of the use of expert advice in policy-making on the EU level and its associated mechanisms of accountability (Liberatore 2001).

The authors also employ the category of 'core science' in opposition to post-normal science. 'Core science' refers to traditional academic 'puzzle solving' for the sake of establishing (new) knowledge of the workings of nature without external ends. One can say that it is purely 'curiosity driven'. According to Funtowicz and Ravetz, this normal science work is carried out on well-defined sets of problems and is evaluated in closed communities of practitioners who have the exclusive esoteric expertise to establish measures of quality. This type of science has, according to the authors, been successful to the extent that it has excluded other types of knowledge in societal decision making. However, the success was established by ignoring uncertainty in both knowledge and values, and their explanation of the emergence of post normal science is that: "Now that the policy issues of risk and the environment present the most urgent problems for science, uncertainty and quality are moving in from the periphery, ... , of scientific methodology, to become the central integrating concepts." (Funtowicz & Ravetz 1993: 742). The theories and methodologies of 'core science' are used in applied science in order to solve practical, (not epistemological) problems on a level where both uncertainties and value-issues can be managed on a routine, technical level, i.e. when knowledge is required to solve a given problem that is manageable and uncontroversial. Hence they call applied science 'mission oriented' (Funtowicz & Ravetz 1993: 740). Professional consultancy entails problems with both higher degrees of complexity and higher decision stakes, for instance the incorporation of error costs into decisions, or the readiness to deal with surprises. In addition to mastering scientific tools, professional consultancy requires experience and another type of analytical skills. These skills are often put at the disposal of a client, and Funtowicz and Ravetz hence label this type of activity as 'client-serving'. (Funtowicz & Ravetz 1993: 740). The activity of post-normal science is labelled as 'issue-driven', since it consists neither of practical assignments nor advanced problem-solving for clients, but rather of the urgent issues facing communities or societies as such.

Paradigmatic examples of problems that belong in the domain of post-normal science are environmental problems like ozone depletion or the greenhouse effect, but other more 'localised' environmental problems, like the storage of nuclear waste or the release of GMOs, also belong in this category of problems.

The label post-normal science is derived from a discussion of Kuhn's concept of normal science as puzzle solving, the central suggestion of this discussion being such puzzle solving is no longer adequate for facing the risk problems which "have to a large extent been created by the practice of normal, puzzle-solving science and technology." (Funtowicz & Ravetz 1992: 268). The basic suggestion is, hence, that a new type of problems with structural features that make traditional problem solving inadequate have emerged. A basic problem in situations where system uncertainties are high and values are disputed is that scientific knowledge and advice is never uncontroversial. Scientific knowledge and facts can

never resolve policy conflicts, but they are likely to act as a resource that can be drawn upon in such conflicts.

Problems inducing post-normal science are therefore problems where the established sources of knowledge cannot deliver solutions that are satisfactory to all stakeholders. For this reason, the stakeholders must occupy a more prominent place in the evaluation and quality assurance of knowledge rather than just being passive recipients of the outcomes of scientific inquiry and disputes. Funtowicz and Ravetz hence claim that post normal science is characterised by an 'extented peer review' potentially including all stakeholders in the issue and "comprising a dialogue among all the stakeholders in a problem, regardless of their formal qualifications or affiliations" (Funtowicz & Ravetz 1992: 254). In addition, what the authors label as 'extended facts' need to be taken into consideration in making decisions. 'Extended facts' means data and knowledge that is not necessarily gathered according to scientific practices, and includes anecdotal evidence and 'community generated statistics' (ibid). This in turn can facilitate a 'democratisation of science', "not in the sense in the sense of turning over the research labs to untrained persons, but rather bringing this relevant part of science into the public debate along with all the other issues affecting our society." (ibid).

Just like 'normal science', post-normal science has 'insiders' and 'outsiders' (ibid: 269). However, where normal science is shielded from external influences in the sense that it defines what relevant problems to investigate are and only peers are considered as able to judge the value of a disciplinary contribution, post-normal science is characterised by the fact that when traditional science cannot deliver adequate solutions to pressing problems, 'outsiders' are involved both in setting the research agenda and evaluating the outcomes.

Funtowicz and Ravetz are not entirely explicit about when their analysis is diagnostic and when it is prescriptive. Nor is it clear how this type of post-normal science can be or is institutionally anchored. However, it is exactly this kind of more interactive form of knowledge that the pleas for increased public involvement often aim to embody.
The authors are, however, keen on stressing that post-normal science is indeed a type of science and not 'merely politics or public participation' – it is a form of problem solving that is appropriate to the needs of the present (Funtowicz & Ravetz 1993: 750). They go on to claim that the "extension of the peer community is ...not merely an ethical or political act; it can positively enrich the processes of scientific investigation." (ibid: 753). In this sense it is meant to constitute a to complement academic and applied science and professional consultancy, not substituting them. However, it seems unclear exactly by what means of communicative mechanisms or organisational frameworks these processes are meant to take place, let alone whether they will in fact deliver solutions that are more satisfying to all stakeholders and will mitigate controversy. This will in part be explored in the case studies, which arguably fulfil at least som of these characteristics.

In two books and a number of articles, Nowotny, Scott, Gibbons and colleagues present an argument not too dissimilar from Funtowicz and Ravetz in which they claim a fundamental change in (scientific) knowledge production in contemporary society. (Gibbons et al. 1994; Gibbons 1999; Nowotny 2000; Nowotny et al. 2001; Nowotny 2001). They summarise a broad range of tendencies in the phrase *Mode 2 science* or *Mode 2 knowledge production*, which aims to describe something new and different as compared to traditional, disciplinary scientific activity, termed Mode 1. The main thrust of the argument is based on the claim that an increasing *contextualisation* of knowledge production is taking place. This contextualisation in turn induces changes in quality measures and institutional arrangements surrounding the production of knowledge, but is also claimed to affect the 'epistemological core' of scientific activity (e.g. Gibbons 1999: c82). Unfortunately, the authors do not present a clear definition of what Mode 2 is, presumably because the concept is meant to cover a whole range of phenomena. In their 1994 book The New Production of Knowledge (Gibbons et al. 1994) the authors claim that Mode 2 is "...transdisciplinary. It is characterised by a constant flow back and forth between the fundamental and the applied, between the theoretical and the practical...", it is "... characterised by a shift away from the search for fundamental principles towards modes of inquiry oriented towards contextualised results." (ibid: 19). It is not entirely clear to what extent Mode 2 will replace traditional scientific activity, or whether the two can coexist, but the authors seems to imply that even traditional knowledge producing institutions, notably universities, cannot avoid being affected in their social organisation by the changes, even if impact varies from field to field. At one point it is claimed that: "Mode 1 knowledge production lives on." (Nowotny et al. 2001: 54). At another place it is suggested that Mode 1 will disappear into Mode 2 (Gibbons et al. 1994: 154).

In their 2001 book, they extend their argument to the claim that the transition to Mode 2 science is part of a larger societal transformation to a *Mode 2 society*. Mode 2 society is characterised by a move "beyond the categorizations of modernity into discrete domains such as politics, culture, the market – and, of course, science and society; and, consequently, that under Mode 2 conditions, science and society have become transgressive arenas, comingling and subject to the same co-evolutionary trends." (Nowotny et al. 2001: 4). These are rather bold claims and cannot be discussed at length here. However, what I find interesting and relevant for my research is their discussion of the 'social accountability' and 'socially robust knowledge', recurring themes in their writings. That knowledge is socially robust means that it fulfils requirements other than the standard 'truth' or 'objectivity' demands of traditional disciplinary research. Knowledge has to be valid, that is applicable, in situations where social, political and ethical issues are at stake and dependent upon the application of knowledge. In a short formula they present this as a historical shift in the sense that for most of its history science as an institution has been 'speaking to society' and providing knowledge – even dominating our ways of knowing to a monopolistic degree

(Nowotny et al.: 50-51) – but now society 'speaks back to science'. According to the proponents of the Mode 2 concept, this 'speaking back' does not only consist in demands for the profitability of research, but also in demands of a broader social character. Hence they claim that 'science moves into the *agora*' (ibid: chap. 13).

The *agora* is adopted from its Greek meaning of a public space in a city state that is "populated by a diversity of individuals who combine the roles of 'citizen' and 'consumer', while at the institutional level typically markets and politics set the rules within which this ceaseless process of negotiation and re-negotiation takes place" (Ibid: 206). "Although the agora is a structured space, it is wrong to attempt to subdivide it again into sectors like markets, politics or media. ... As a public space, the agora is shaped by the interaction of its actors/agents. Some are more visible, easier to identify and recognize and more powerful that others. But the agora is also a space in which different perspectives are brought together, ultimately creating different visions, values and options." (ibid: 209-10).

A further reason for paying attention to these discussions is that also these authors claim that the processes they describe have special validity for newer problem fields such as environmental protection, information technologies and biotechnology. Especially in biotechnology, research seems to an increasing degree to take place in 'contexts of application' where the knowledge production is an iterative process between what is technically possible and what is theoretically understood (and socially viable), rather than a linear process moving from basic theoretical insights to the ability to purposively manipulate entities in order to produce manageable technologies. Therefore the authors claim that biotechnology is particularly in need of processes of socially robust knowledge production and especially pertinent to various forms of popular influence. Hence, the field of biotechnology should be a good place to study whether some of these claims can be empirically substantiated. Furthermore, one of the conclusions the authors draw is that "(i)f expertise is becoming socially widely distributed and transgressive, trust becomes an even more scarce and precious resource" (Nowotny et al.: 261), which is very much in line with what this thesis intends to investigate.

The writings on Mode 2 are not empirically well-substantiated, and it is in my opinion therefore difficult to distinguish between 'diagnoses' of current occurrences and trends, and normative prescriptions. Nor, I will argue, is it clear from their writing how the processes of social quality assessment they envision are turned into concrete practice.[38] Nonetheless, this kind of thinking is often referred to in the discussions of increased public involvement.

[38] To the extent they claim that they are describing already existing social processes, they provide very few specific examples and no operational guidance as to what criteria should be fulfilled before a 'mode 2 verdict' is justified.

A slightly different perspective underpinning the calls for increased involvement of the public, also preoccupied with the quality of knowledge underpinning policy making and risk management, concerns the status of lay knowledge as compared to formalised scientific knowledge and the interaction between the two types of knowledge. An influential proponent of this approach is Brian Wynne, on whose writings I will base the discussion (similar arguments can be found in Fischer 2000, Sclove 1995).

Reoccurring themes in the writings of Wynne are critiques of, on the one hand, the reliance of policy making and risk managing institutions on scientific knowledge in ways that in reality denies or excludes uncertainties inherent in all knowledge production and, on the other, the tendencies of these same institutions to misread the concerns of the public, which underlie a number of technological controversies (cf. the discussion in Chapter I). These misperceptions of the public mean that lay persons' valuable knowledge is excluded from policy-making and risk assessments. This 'scientification' of issues that in reality have significant normative and political components in turn aggravates controversies and causes mistrust in authorities and experts to proliferate rather mitigate.

In a number of publications Wynne has offset his argument in newer, constructionist studies in the sociology of science, advancing that the use of scientific knowledge by policy-making institutions must be seen as a particular cultural form, which is often at odds with the cultural forms of the people and communities into which such institutions intervene and are meant to protect – yet the institutions do not realise this. According to Wynne technological controversies should not be seen as expressions of confrontation between a (*the*) superior type of rationality and irrational fears, which consists of either distorted or poorly understood scientific knowledge of, for example, physical risks. Hence, when 'objective' scientific risk assessments are pitted against the 'risk perceptions' of lay people and controversy arise, this, according to Wynne, does not just entail some battle of scientific objectivity against 'ways of life', but should be considered as "cultural responses, to a *cultural* form of intervention" (Wynne 1996: 67).[39] It is the product of different ways of responding to uncertainties inherent in many aspects of social regulation, for instance of GMOs.

> *"Whereas science typically responds to this diversity of problem-situations by attempting materially to reorganize the problem-setting into uniform, quasi-laboratory versions, and then applying standardized and precisely defined solutions, ordinary lay knowledge usually eschews this moral stance or epis-*

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[39] Wynne's major empirical case is a study of interaction between Cumbrian sheep farmers and scientific officials following the radioactive fall-out from Chernobyl. His interpretation is that this was basically a cultural conflict where the scientist's scientific approach was unable to incorporate the local knowledge of the farmers on local geographical features and sheep husbandry. "*The farmers assumed predictability to be intrinsically unreliable as an assumption, and therefore valued adaptability and flexibility, as a key part of their cultural identity and practical knowledge. The scientific experts ignored or misunderstood the multidimensional complexity of this lay public's problem-domain, and thus made different assumptions about its controllability. In other words, the two knowledge-cultures expressed different assumptions about agency and control, and there were both empirical and normative dimensions to this.*" (Wynne 1996: 67).

temology of control. Instead it negotiates the problem-definition at the same time as it negotiates the solution." (Wynne 1993: 326)

Wynne argues that scientific and science based institutions in charge of, again for instance, risk assessments of GMOs operate on and actively maintain assumptions that their knowledge can effectively control and manage the uncertainties inherent in the technologies they seek to govern, and that they are at the same time unreflective about their interventions in social contexts beyond the validity of laboratory knowledge. In the eyes of many members of the public – in light of their everyday life and historical experiences – this does not seem credible. It is to the institutional aspects of risk management that lay people or 'the public' often respond in controversies, as much as the immediate cognitive context of risk assessment. Therefore, Wynne argues, lay knowledge should not be understood as a somehow deficient version of scientific knowledge, but as a creative source of knowledge in its own right, which often entails valuable insights and experiences, especially about the 'body language' of institutions.

"I have attempted to argue, against predominant assumptions, that 'modern' science exhibits much less reflexive capacity to problematize its own founding commitments than is supposed. At the same time... I have suggested that 'traditionalist' lay public enjoy a much greater capacity for such reflexivity in relation to science than is usually recognized. Scientific knowledge deployed in public invariably involves normative commitments and interventions which are part and parcel of the scientific discourse. It frequently incorporates and is shaped by implicit models of user-situations or social practices whose correspondence or not with the empirical situations affects its validity and public legitimacy. Research and experience have shown that science is not well able to recognize and problematize these framing social assumptions, which can turn into prescriptions as the knowledge is deployed in practice." (Wynne 1992: 334)

Wynne's diagnosis is that much public scepticism, alienation and mistrust springs from the fact that authorities 1) despite plenty of historical experience will not acknowledge that unforeseen and unforeseeable events may occur, and 2) authorities have no answers to the questions about how to tackle such surprises should they arise (the BSE case being an obvious example) (Wynne 2001a).

This leads the author to warn against what he sees as a tendency of institutions towards addressing, say, the controversies over GMOs as split into separate elements, one pertaining to risk, of which the 'real' assessment can legitimately only belong in the hands of scientific expertise, whereas lay people can legitimately be involved only as 'moral compasses' to consider deontological issues beyond the scientific domain. This denies lay people the possibility to bring their knowledge and experience to bear on central elements of their concerns, namely the institutional handling of uncertainty.

Just as Wynne argues that an institutionalised distinction between risk and ethics is untenable, so he claims that a strict distinction between experts and lay people is not tenable. Sociologists need to consider "the fluidity, porosity and constructedness of the boundaries

established between them" (Wynne 1996: 62), which to some extent can be seen as in line with the claims about post-normal science and Mode 2 knowledge production.[40] Furthermore, his perspective makes it both instrumentally and normatively desirable that the public be substantially involved in technology policy.

> *"In seeking the basis of more legitimate, less alienating forms of public knowledge, and stable authority out of present conditions of incoherence and disorientations, new constitutional norms of valid knowledge may be articulated. Necessary and legitimate involvement of lay publics in this process will also automatically involve them in negotiations, direct or indirect, of the intellectual contents of those new universals."* (Wynne 1996: 78)

As such, the involvement of lay perspectives in policy formation is believed to help in countering the overtly reductionistic worldviews of technical expertise, which have allegedly caused many of the risk problems modern societies are struggling with. It can also serve to facilitate dialogues that prevent the development of myths among decision-makers and regulators as analysed by Marris et al. (2001), and contribute substantive rationality to concrete problem solving for policy making bodies and risk assessors.

Although Wynne himself is rarely explicit about exactly how the envisioned forms of social and institutional learning he is calling for could or should be organised on an operational level,[41] the protagonists of such procedures often refer to Wynne and his colleagues to justify the necessity of more public involvement, perhaps especially when arguing that lay people are in fact qualified to be actively engaged in complex technological matters and can provide important contributions and perspectives.

As the approaches reviewed in this section show, the diagnoses of a changed focus of and social conditions for scientific knowledge production and use in policy-making are often paired with advocacy for a more 'democratic' governance of science and technology. Nonetheless, these perspectives are not always particularly explicit on how their ideas and recommendations can be turned into concrete practices. However, in much of this advocacy an affinity to the ideas and procedural forms associated with deliberative democracy can be observed and diagnoses of the need for new modes of managing risk and uncertainties are

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[40] Although it must be noted that Wynne is not making a claim about a radical change in the social configuration. Instead, he advocates a constructionist epistemology.

[41] Sometimes Wynne expresses what appears to be astonishment that institutions do not simply learn from reading sociological analyses: *"This point about public responses and their supposed object has been made before, both about the nuclear issue and more generally, but it seems to be a difficult insight to digest especially in policy circles. There has been twenty years or more of research demolishing the self-destructive fallacy of the 'objective risk versus perceived risk' characterisation of the nuclear public conflict issues, which was assumed to describe the deep and irreconcilable gulf between institutionalised scientific vies and public views of the issue. Yet despite this apparent falsification, and despite repeated lip-service to its obsolescence, the same basic construction of the public and its ways of reasoning 'about risk', can be seen to have survived to shape dominant framing of the current controversies over GM crops and food."* (Wynne 2001: 54).

often combined with deliberative elements.[42] This, I believe, is done in two ways. On the one hand the theory of deliberative democracy is used to give a philosophical basis to claims of mis-recognised rationality among non-experts as well as the exclusion of their values, which deserve greater attention for democratic reasons. On the other hand it is utilised to devise and assess the actual procedures through which such increased involvement of the public is meant to take place. In order to clarify this, I shall therefore try to explicate how this line of thinking has also inspired the development of PTA procedures.

Participatory Technology Assessment as Deliberative Democracy

The emerging interest in (re)shaping science and technology policy-making along more participatory and discursive lines is clearly both a pragmatic and normatively grounded response to the proliferation of a number of technological controversies. Public controversies and debate on technology can of course be seen as an informal type of constantly ongoing technology assessment, where aims and means are exposed to collective deliberation. However, compared to this, organised TA, and especially PTA, can be interpreted as attempts to formalise, institutionalise and from some perspectives also to domesticate controversies over technologies as they are played out in the public sphere (Hennen 1994, 1997).[43] At least two purposes are aimed at in doing so. One is to qualify the debates by structuring them and introducing scientific knowledge into them in a more systematic manner than can be achieved in ordinary debates in the public sphere. Another is to create organisational forms that will link public articulations of concerns more directly to decision-making institutions in a proactive manner.

Some perspectives on PTA mimic a normative ideal of the public sphere by arguing for 'mini-public spheres' based on the regulative standards underlying deliberative ideals of public debate (e.g. Brekke and Eriksen 1999). Therefore, I will first spell out some central traits of these ideals, and then consider how they are adapted to fit PTA procedures.

The public sphere as a normative concept has its roots deep in political philosophy. However, for contemporary discussions it seems that the concept was reinvigorated with the seminal work of Habermas *Strukturwandel der Öffentlichkeit* (1990 [1961]), where the concept was reconstructed from historical developments into a regulatory ideal for public will for-

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[42] Elam and Bertilsson (2003) suggest that this may have to do with the fact that deliberative democratic ideals to some extent 'mirror' an idealised image of the scientific ethos, with its emphasis on reasoned argument and openness to perpetual self-examination and collegial criticism. As such, deliberative procedures are perhaps more acceptable to scientist met with expectations of more 'responsiveness', than other democratic models. Scientists feel more confident with that type of deliberation than with more adversarial forms of policy formation. They are to some extent privileged in discursive arenas as they in a sense already operate in a cognitive and argumentative mode. Hence, in some respects the calls for more public involvement with science tends to make politics more like science, rather than politicise science.

[43] *"Die unorganisierte öffentliche Kontroverse soll in einen die Rationalitätschancen erhöhenden organisierten Diskurs überführt werden."* (Hennen 1997: 197, references ommitted).

mation in the modern age. This idealised public sphere has ever since been central in the writings of Habermas and has also been taken up by most theorists of deliberative democracy as its locus. A central tenet here is that public deliberation serves to support democratic collective will formation, which goes beyond the mere aggregation of preference as envisioned in pluralist models of democracy. The ideal does not reflect the empirical reality of contemporary mass mediated politics, but it goes some way in embodying certain elements of the self-understanding of modern democracies. These ideals are for instance constitutionally embodied in the freedom of speech, a free press etc., and some observers note that modern societies are ideologically disposed to continually expand the possibilities for participation and deliberation (for a not uncritical review of this tendency in relation to technology see Bora 1999). In the Habermasian conception the public sphere is, furthermore, equipped with the function of serving as a connecting link between the life world of the citizens and the functional subsystems of society (Habermas 1992). As such, communication in the public sphere is carried out by citizens who step out of their private sphere to debate matters of common interest with each other, with the purpose of exploring and forming a 'public opinion'. This public opinion is something other than the aggregated preferences measured in opinion surveys, as it is characterised as being the product of collective deliberation, i.e. the use of 'public reason'. It is assumed that (under ideal circumstances) the arguing and exercise of reason in public will lead, on the one hand, to the formation of a collective will and identity, which can set goals for a community and, on the other, to more rational solutions to shared problems, as all viewpoints and interests are explored openly.

If a public sphere is to fulfil such purposes it must, according to Bernhard Peters, possess three basic characteristics: 1) equality and reciprocity, 2) openness and adequate capacity and 3) a discursive structure (Peters 1994: 46). Equality and reciprocity mean that in principle all citizens should have equal possibilities of bringing themes and argument into the public debate, they must be willing to listen to the arguments of others and respond with arguments. Openness and adequate capacity refer to the principle that all themes may be made the object of public debate and that all themes put on the public agenda must be dealt with adequately. Which themes are suitable for public debate cannot be decided *a priori*. This must be decided in the course of public deliberation. In this way the public sphere can be sensitive to themes that the political or administrative systems alone may not perceive and can hence contribute to identifying problems. Finally, a discursive structure means that public deliberation must be based on arguments supported by good reasons. They cannot be based on status, power, intimidation or manipulation. In turn, this also means that only arguments aiming at the common good can be used in public. The defence of private interests is illegitimate in public deliberation (unless, of course, it is argued that private interests are facilitating the common good).

Deliberation in the public sphere is furthermore characterised by being 'lay communication'. It must take place in language, which is accessible and comprehensible to all competent citizens. It can draw support from expert knowledge, but when experts appear in the public sphere they must communicate in non-esoteric ways comprehensible to non-experts.

An important element in the deliberative democratic model is that the outcomes of the collective deliberation, which takes place in an unstructured and unorganised manner, is subsequently fed into decision making in more formalised forums. Thus, it will be able to influence the operations of the functional subsystems of society. It is not clear by what means such influence takes place (ibid: 48), but it is assumed that the political system is to some extent sensitive to the opinions expressed in the public sphere, and that the political system in turn can steer or at least condition the operations of other systems.

It is not difficult to see that existing public debates rarely live up to these ideals in the full sense. They are exposed to asymmetries with regard to visibility, influence and knowledge (ibid: 52). However, nor are the ideals completely without counterparts in reality, as they reflect at least a conception of how public debate *ought* to function, which can be alluded to in the debate itself and serve as a self-correcting function.

From a public sphere perspective technological controversies can be considered as ongoing collective deliberations about how technology ought to be managed (Hennen 1994). This of course invites considerations of the quality of such debates and their ability to influence technological trajectories and regulatory principles and practices in general (Bechmann 1997). This is a challenging task and the aim here is to explore and explicate how such ideals have been appropriated and adapted in the search for technology assessment tools capable of mitigating such controversies.

When broader sociological and theoretical considerations occur in the discussions on participatory and deliberative procedures in the science and technology domain, references are often made to Habermas, and such procedures can be understood as attempts to transform the Habermasian idealised speech situation and the workings of an idealised public sphere into real communicative processes in order to formalise and rationalise technological controversies (see e.g. the volume edited by Köberle et al. 1997).

The Habermasian inspiration is for instance strong in a much quoted book edited by Renn et. al. (1995). They define public participation as "... forums for exchange that are organised for the purpose of facilitating communication between government, citizens, stakeholders and interest groups, and businesses regarding a specific decision or problem." (ibid: 2). To call such procedures discursive implies "equality among the participants, peer review as a means for verifying understandings (i.e. holding knowledge claims up to public scrutiny), and an orientation towards resolving conflicts in consensual rather than adversarial ways." (ibid: 3). This summarises important elements of the discourses on PTA well.

As mentioned at the beginning of this chapter, there are very few purely normative or purely functional arguments in favour of increased public involvement. Nonetheless, there is perhaps a certain tendency within normative arguments in favour of increased participation and deliberation to consider broader inclusion as desirable in itself, because 'more' democracy is *per se* better than 'less' democracy. As such, calls for increased participation and deliberation in the technological domain are part of a general participatory semantic characterizing modern societies (Bora 1999: Chap 1). However, as the point of PTA is to do away with technocratic dominance in the governance of science and technology, but obviously not to neglect the cognitive contributions of scientists, such procedures can be seen as exposed to a tension between competence and fairness. According to Renn et al. the Habermasian theoretical programme can be used to devise PTA procedures that fulfil the requirements for both competence and fairness, as it is founded on an intrinsic relation between rationality and social justice. Given appropriate organisational forms, inclusion is assumed to lead at the same time to 'better' (i.e. more comprehensively rational) and more just (i.e. considering the interests of all concerned) solutions to (decision) problems.

From the perspective of deliberative democracy discursive procedures are primarily seen as a means to explicate value differences and explore where common ground can be found without neglecting empirical knowledge. In the Habermasian version this often entails communicative processes working from concrete problems towards abstract and general principles that can be commonly accepted, in other versions by searching for and specifying 'local solutions' acceptable to the affected and involved parties (Pellezzoni 2003a, 2003b). Central here is the assumed ability of deliberation to bring out (hidden) value assumptions in what is otherwise seen as neutral expert knowledge and expose such normative assumptions to collective evaluations.

Another central argument in favour such procedures is their alleged ability to rationalise technological controversies.

> *"Mehr oder wenig deutlich wird mit dem Rekurs auf den Diskursbegriff aber auch ein Anspruch formuliert, der bisher eher implizit im Zusammenhang mit partizipativen Verfahren der Technikfolgen-Abschätzung erhoben wurde: Die gesellschaftliche Auseinandersetzung über Technik soll "rational" gestaltet, Kontroversen über Technik sollen "versachlicht" bzw. ihre Interessenhaftigkeit entkleidet werden. Von einer "diskursiven" TA erwartet man im Idealfall die Erzielung von Konsens in bisher umstrittenen Fragen durch Verpflichtung der Beteiligten auf "argumentative", "sachliche" Auseinandersetzung.".* (Hennen 1994: 455)

In short, justification by means of reasoned argument is meant to substitute professional status or political power as descisive for decision-making. This rationalisation is assumed to stem from a communicative rationality, where not only cognitive (technical) but also normative and expressive/aesthetic viewpoints can be considered. As mentioned, the normative ideals of the public sphere are often mimicked in the set up of such procedures. This

of course poses some challenges and as will become clear from the case studies the ideals can be embodied and operationalised in quite different manners.

While the ideal public sphere is 'unlimited' in both social, substantive and temporal terms, meaning that everybody is allowed to participate, everything can be made an object of deliberation and deliberation can in principle go on indefinitely, TA procedures as organised discourses are obviously limited and situated in all three dimensions. Before procedures even get going decisions must be made about how participation is to be regulated, the topics to be included and excluded from consideration, and the time frame of the deliberation. In the social dimension this of course primarily raises issues about who is suitable to represent whom, in the substantive dimension about what the relevant issues and knowledge to be considered are and in the temporal dimension when deliberation can be terminated and decisions made (see for example the volume edited by Joss and Bellucci (2002) on the multitude of 'design choices' to be made in organising PTA procedures).

So far I have tried to illustrate what I see as two distinct (but not mutually exclusive) strands of thought underpinning the arguments in favour of the development of PTA procedures. The first strand can be said primarily to focus on how increased participation and deliberation can allegedly improve the management of risk and uncertainties in ways that will find public acceptance. The second focuses more on how to expand political inclusion in order to improve the social rationality guiding technological development by seeking a consensual value base for collective decisions. However, among policy makers and TA practitioners more pragmatic considerations also come into play, which, though obviously not devoid of normative content, tend to be driven by more functional and instrumental considerations. This is more or less identical to the third problem complex in Pellizzoni's model and has to do with managing complexity. Although the different aspects are interwoven, the focus in the more instrumental approaches does not put as much emphasis on 'democratising technology' as on mitigating conflicts and creating public acceptance. As such, it can actually be seen as compatible with more elitist conceptions of democracy (Webler and Renn 1995: 23).

From a sociological perspective it can be argued that technological controversies and 'resistance' to new technologies should not necessarily be considered dysfunctional as they can potentially induce social and institutional learning as well as influence technological trajectories in desirable ways (Bauer 1995). Nevertheless, such controversies are mostly seen as undesirable by the institutions and organisations introducing and regulating technologies, as they tend (at least in the short run) to create rather than do away with complexity.

From this more pragmatic perspective the purpose of technology assessment in general and PTA in particular is to mitigate such controversies. Therefore, PTA is perceived to serve a dual function. On the one hand, it serves as an early warning system identifying in advance

potential controversial aspects of technological trends in the making.[44] On the other hand, it creates forums that can facilitate dialogue between citizens and decision-makers and regulators with the aim of informing the latter and regaining or maintaining the trust of the former. As such, PTA procedures can be seen as instruments for gathering 'social intelligence' and displaying competence. From this perspective the cognitive monopoly of scientific expertise is not (necessarily) questioned as in some of the other perspectives discussed above, but it is acknowledged that expert excellence is not in itself sufficient to maintain public confidence and hence acceptance of new technologies. In such pragmatic arguments the point is often made that more dialogical interactions between experts/regulators is a necessary condition for (re)establishing public *trust*, although it is rarely explained what is understood by 'trust' apart from the absence of controversy.

These alleged effects are of course recognised by the more normatively oriented proponents of PTA (and undoubtedly used to promote such procedures). However, more 'democratically minded' writers warn that if PTA is organised primarily or solely for 'therapeutic' purposes, i.e. in the hope of creating acceptance for decisions either already made or to be made elsewhere, then such procedures may in reality lead to disappointments and disillusionment among the participants and the wider public. This may in fact prove counterproductive (e.g. Wynne 2001a).

Organisational Aspects of Participatory Technology Assessment Procedures

When it comes to putting ideas into practices – what I have termed the 'operationalisation' of the public – a broad spectrum of organisational forms have been suggested and experimented with. A central distinction in application is one between 'public' and 'stakeholder' PTAs (Bellucci et al. 2002, Pellizzoni 2003a). 'Public' PTAs are procedures where the involvement of 'unorganised' lay citizens without any immediate interests in the technology is central in order to probe into their perspectives, values and evaluations. These are then (ideally) fed into decision-making. Such lay people are most often considered eligible for participation as members or representatives of 'the public', i.e. as political subjects. Although authors such as Wynne argue that lay people often possess cognitive knowledge, perhaps of a 'localised' nature, that can in itself be valuable for decision-making, the participation of citizens is usually considered as important because of their 'normative competence'. 'Stakeholder' PTAs, on the other hand, primarily involve organised actors who are brought together in an attempt to make them deliberate, that is to collectively explore a given issue in order to provide 'rational' solutions, rather than just to bargain. The entitle-

[44] An example of this is the multitude of social scientific research programmes launched with focus a on nano-technology in several European countries and at the EU level. These are often framed as an attempt to avoid the kind of 'stigmatisation' biotechnology has experience by proactively assessing potential social impacts and stimulating public debate – on a set of technologies that practically do not yet exist.

ment to participate in stakeholder PTA procedures can be based on a number of qualities, such as representation of citizens' concerns, economic interest, (special) cognitive competences, particular exposure to the consequences of decision-making etc., which are generally considered as links to 'civil society'. Pellizzoni (2003a) describes some of the differences between the two types of PTA and discusses some of the challenges they face that may render them vulnerable to criticism. These, however, take different forms in the two types of PTA.

As lay people being asked to deal with complex technological matters will usually need some kind of expert information, the framing of both the problems to be evaluated and the knowledge to be applied is obviously important. There is, in short, a danger of selective information or outright manipulation of lay people by experts.

It is clearly important for both the democratic and 'therapeutic' effects of PTA procedures that the products of lay people's deliberations are ensured some kind of impact on decision-making centres, whether lay people are made active participants in decisions (as in some more local controversies) or expected to act as policy advisors.

The fact that public involvement is often argued as a means to remedy deficiencies in existing representative democratic institutions does not mean that they can avoid the issue of how to establish representativity. In procedures with lay involvement it is necessary to decide what the relevant constituency actually is – an issue, which is often central to the controversy to be addressed. Furthermore, this also depends on the specific understanding of the purpose of participation. Are participants to be selected "as representatives for others with similar characteristics, interests and values or as citizens who, whilst reflecting on their own values and experiences, are also open to the possibility of transformation in light of their reflections and deliberations with other participants?" (Smith and Wales 2000: 57 (quoted from Pellizzoni 2003a)).

For stakeholder PTAs other issues arise. Here the risk of manipulation by experts is less pronounced as stakeholders often command cognitive resources and are aware of the conflicting problem framings at stake. However, questions arise as to whether there are (sufficiently strong) organised interest groups to maintain the interests and argue from the perspective of all the groups whose interests and viewpoints should legitimately be considered in the given case (including vulnerable groups without the capacity to organise, e.g. people with illnesses, future generations etc.). Complementary to this is the question of whether organisations develop oligarchic tendencies, where they seek to maintain the interests of the organisation rather than the interests of the members. In organisational terms this also raises issues about whether participants have sufficiently strong contacts with and command over their constituencies to make outcomes of deliberation acceptable to members and constituencies. The latter may not have followed the learning processes aimed at in the PTAs, which raises the question of whether the legitimatory effects expected from PTAs will in fact 'trickle downwards'.

In order to achieve the expected gains of (social) rationality and creativity from deliberation a certain willingness to 'virtualise' viewpoints and interests is required of the participants. Stakeholder PTAs are therefore faced with the dilemma that the closer the procedures are to important decision-making, the greater the tendency for strategic rather than discursive behaviour, and PTAs will be difficult to differentiate from corporatist bargaining.

Pellizzoni summarises the main characteristics of the two types of PTA and their respective central challenges in the following table:

Type of PTA	Type of legitimation	Major issues	Emerging tension	Consequences of uncertainty
Public PTA	normative competence (values) political citizenship	manipulation of opinions minority visions influence on decision process	Representativeness vs. exemplarity	Facts and values overlap
Stakeholder PTA	normative and cognitive competences (interest, knowledge) civil citizenship	visibility of positions legitimation of positions closeness to decision process	Understanding on common problem vs. strategic compromise	Difficult interest definition

Source: Pellizzoni 2003a: 202

A further distinction central in the operationalisation of PTA procedures is whether they are *problem-induced* or *technology-induced.* In problem-induced TAs the starting point is the observation of a societal or environmental problem, which (may) gives rise to a search for technical solutions. In technology-induced TAs the starting point is usually the emergence of a new technology or application, whose effects and/or acceptability are then assessed. There appears to be a (normative) preference in the theoretical writings on TA for problem-induced approaches, as they in principle allow for the assessment of a wider spectrum of possible solutions to a given societal need. However, in practice TA procedures are almost exclusively technology-induced. This is so partly because of 'cognitive economy'. Considering a number of equivalent solutions in economic, social, technical and ethical terms is often not feasible, especially if competing technological paradigms are at different stages of development. Or it can partly be seen as a structural feature of the role of technology assessment in liberal societies. TAs are meant to mitigate the adverse effects of technological developments, but there is often little political support to establish a broad (political) steering of research and innovation. Therefore, there is rarely an interest in questioning all the dispositions inherent in a given technological paradigm by evaluating (all of its) potential functional equivalents.

Just as the social configuration and the substantive framing of the topics to be covered in PTAs can vary significantly, so can the temporal 'location' of PTA procedures along a technological trajectory. In the conceptual discussions on TA and PTA the Collingridge dilemma features as a prominent temporal problem (e.g. Ropohl 1996: 231). The dilemma explicates that in the early phase when a technological paradigm can be significantly influenced, little is known about its physical and social impacts, but at later stages when more knowledge and experience is available, things are proportionately more difficult to change because of invested resources and implemented solutions. This is of course recognised by the proponents of PTA and it is argued that 'the public' should be involved in and encouraged to deliberate technological innovation as soon as possible. This, however, may not be a stage where issues are controversial and it may be difficult to activate and mobilise people in a meaningful way. This is of course closely related to social and substantive dimensions, and a tendency can be seen for stakeholder procedures to be more prominent in later stages where the problem-contexts are more structured and interest positions are marked more clearly. Public PTAs seem more adequate for selecting a value base when faced with the choice between different potential technological trajectories.

This chapter has introduced a series of analytical and normative modes of observation, which have in recent years been suggested as solutions to technological controversies, including those raised by the new biotechnologies. I contend that these discourses of participation and deliberation have influenced the modes of operation of the institutions and organisations responsible for dealing with technological controversies. Subsequently, I shall use the discussions of this chapter to devise a framework for analysing and comparing my cases as empirical manifestations of such procedures. However, prior to addressing the empirical work, I shall attempt in the next chapter to dig deeper into the sociological theorising on technological controversies, and the socio-structural location of participatory and deliberative procedures.

Chapter III
Theoretical Explorations of Risk, Trust and Participation in a Functionally Differentiated Society

If one assumes that the kinds of controversies over new technologies and the various ways to confront such controversies discussed in the previous chapters are not incidental occurrences in modern society, then a sociological inquiry must ask how they are related to and grounded in more general features of society. This thesis is based on the assumption that its object of investigation – institutional responses to technological controversies that opt for increased public involvement – are contingent on a number of factors but are not random occurrences. It is assumed that such processes are grounded in and conditioned by certain significant traits of modern society. The purpose of this chapter is to explore and discuss what these features are and how sociological theorising can be utilised to explore the empirical phenomena.

The chapter will therefore entail an excursion into more abstract theorising, which should serve several purposes. It will specify the research problem of the thesis through a certain strand of development in general sociological theory and a specific understanding of the structure and dynamics of modern society. It will discuss the ontological and epistemological assumptions underpinning this theorising, which will in turn inform the empirical analyses. Furthermore, it will seek to develop a deeper understanding of concepts that are seen as central in contemporary technological controversies, such as risk, trust, protest, and participation, by linking them to the more general theoretical framework. This will allow me to develop a theoretically grounded 'guide' for the empirical investigation.

When opting for an approach like the one suggested here, where the empirical study is based on theoretical reflections on the structures and dynamics of modern society in general, one is of course faced with the problem of how to choose between the host of competing theoretical approaches available from contemporary discussions in social theory. As there is no generally acknowledged meta-criteria for choosing between theories, it will, to some extent, inevitably be guided by the researcher's interest, existing knowledge and preferences. This is the case here, and in the following I shall explore in particular the systems theory of Niklas Luhmann and its relevance for my topic.[45]

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[45] As such, the thesis will also serve as an exploration of the feasibility of applying this theoretical paradigm in this particular field of empirical research, where it – to my knowledge – has not, so far been widely applied (see, however, Bora 1999 for one notable exception).

Luhmann's theory and the work it has inspired is in my opinion one of the most sophisticated and challenging attempts to develop a general framework of contemporary sociological theory. As such, it presents some quite general observations on what I perceive to be central features of modern societies. It has a conceptual innovativeness, which I believe leads to some valuable insights. These observations, I believe, can also be useful when trying to interpret how controversies over technology are played out. It is furthermore my assumption that the Luhmannian framework, which has no normative commitment to the participatory and deliberative postulates to be investigated, can be particularly helpful in identifying some of the challenges with which such procedures are faced. The framework has the advantage of explicitly approaching some of the issues central to the topic at hand from a genuinely sociological perspective. For example, the management of risk and uncertainty, the creation and maintenance of trustful social relations and the role of 'protest' in the social appropriation of technology.

In the wake of large-scale technological catastrophes and the rise of the environmental problematique sociology has slowly taken up the theme of 'risk'. First within special sociologies like environmental sociology and sociology of science and technology, but at least since Ulrich Beck coined the term 'risk society' (Beck 1986), the risk-thematic has been imported more seriously into debates on general social theory. This has resulted in a plethora of conceptual discussions and empirical studies. However, I am inclined to follow Japp (1996) in arguing that substantial parts of this work more or less uncritically assume the natural scientific concept of risk (Risk = probability of harm $\times$ extent of potential adverse effects), and thus investigate how exposure to such physical risks influences social relations, organisations and institutions. On closer inspection it seems there are only two genuinely sociological paradigms of risk research, that is approaches where not only the social effects of technological risks but the active social construction and management of risks and their links to different forms of social organisation, is the object of theorising. These are systems theory and Cultural Theory (ibid). These two paradigms spring from quite different intellectual sources, but they do have aspects in common, as will be shown in the following, although the primary focus will be on the systems theoretical approach.

The choice to focus primarily on Luhmann's theory does not mean, however, that I believe that this paradigm can necessarily deliver all the concepts and distinctions necessary for a thorough empirical investigation of the kind I wish to undertake. There are clearly areas where the theory seems too general to be applicable to specific empirical investigations (Schimank 2003b). Therefore, I will draw also on theoretical concepts and elements originating in other research traditions where necessary, although maintaining the aim is letting systems theory function as a master frame or 'orienting strategy' (Wagner and Berger 1985)

for the theoretical reflections, as well as letting it provide the central ontological[46] and epistemological assumptions that guide the analysis of the case studies.

Choosing one specific theoretical framework to inform or underpin the study means that a certain amount of effort must go into introducing this framework and discussing its central elements. Ideally, where and how this framework deviates significantly from competing frameworks theorising 'the same' topics should also be analysed and discussed.[47] However, the ambition here is not to engage in any more systematic comparison of theoretical approaches, nor is the following intended to be a comprehensive exegesis of Luhmann (or a particularly critical one for that matter). The aim is simply a brief introduction to the basic elements and assumptions of autopoietic systems theory, which will enable me to apply aspects of the theory to interpret and analyse my cases. Therefore, I will only introduce and discuss aspects of the theory that I believe to be necessary to render its application intelligible, following which I shall focus on some more specific concepts and applications relevant for my research problem. However, since I cannot assume that all readers with an interest in the empirical topics of the thesis are familiar with the works of Luhmann, I have chosen to give a short introduction to the fundamentals of the theory. Readers familiar with systems theory may find it convenient to skip this section.

Introducing a theory as complex as Luhmann's autopoietic systems theory is no easy task. The approach has been developed over some 30 years (Luhmann 1997: Einleitung) and has nothing remotely resembling a linear structure. It has generated significant interest, commentary and criticism in circles well beyond theoretical sociology, which indicates that multifarious focus points are possible. My approach will be to start by introducing some of the theory's fundamental concepts and assumptions (which are indeed very abstract), and then proceed to explain how these are applied in a generalised description of the structure and dynamics of modern societies. I will then move on to discuss some more specific traits and dynamics of interest to the study of technological controversies and how they can be thematised and specified through a systems theoretical mode of observation.

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[46] In principle Luhmann abstains from making ontological claims, and his theory builds exclusively on epistemological assumptions, notably the approach of second order observation. However, where they do not treat topics of the foundations of social theory, it is difficult not to ascribe a certain ontological reality to many of Luhmann's concepts and distinctions, such as the existence of interaction, organisations and functional systems, society as the totality of communication etc. However, the question of whether Luhmann in fact introduces an unrecognised 'systems-ontology' need not occupy me here. For such criticisms see e.g. Joas (1992: 306-326) and Habermas (1985: 426-36).

[47] The objects of theorising are of course reconstructed through a particular mode of observation in different theories. Therefore, the way topics of investigation are understood and delineated does not correspond completely across different analytical frameworks.

In a very general way, Luhmann's theory can be perceived as based on three theoretical complexes, loosely coupled to, respectively, the social, substantive[48] and temporal dimensions of sociological analysis. In the social dimension, communication is the defining characteristic of society and the sociological observation of society. According to Luhmann, 'the social' *is* communication. Communication is what distinguishes society from both its physical and psychical environment, and communicative events are the constitutive elements on which social analysis must be grounded. In the substantive dimension the theory of functional differentiation or polycontextuality is used to explore what Luhmann perceives as the defining characteristic of modern society. Basically, the central structural traits and dynamics of modern society stem from the fact that a number of different and distinct domains, operating according to different logics, have been established. This creates problems of mutual integration and handling of different sorts of externalities. Finally, in the temporal dimension, the emergence of this polycontextural society is described as an evolutionary process, the product of a long historical development, which has not and cannot be planned or 'steered' intentionally.

Starting Point(s)

The three main sources of Luhmann's inspiration are usually said to be Talcot Parsons' structural functionalism, the phenomenology of Edmund Husserl and the adaptations in biology of developments in general systems analysis. It is in particular from the last of these intellectual sources that Luhmann draws his preference for observation through binary distinctions, which is fundamental in his thinking. The most important binary distinction is that between a system and its environment. Although Luhmann attempts to exclude ontological problems completely from his writings and work through the concept of observation through distinctions, his axiomatic assumption is that systems exist: *"Es gibt systeme"* (Luhmann 1984: 31). This is specified into the founding assumption of the theoretical programme – it makes sense and is feasible to analyse 'the social' in terms of communicating systems.[49] The assumption that social systems exist is complemented with a number of

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[48] In German Luhmann speaks of a 'Sachdimension'. In the English translation of e.g. the first of Luhmann's central theoretical works *Soziale Systeme*, 1984 (Social Systems, 1995) this becomes 'the object dimension'. This, in my opinion, has too a objectivistic tone, and does not correspond well with the contructionist assumptions underpinning the theoretical programme. Therefore, I prefer to speak of a 'substantive dimension'. The general point of the tri-partition is that all communications have a social (*who?*), a substantive (*what?*) and a temporal (*when?*) dimension.

[49] Luhmann emphatically avoids answering the ontological question of what 'the social' as such *is*. This position is taken on the basis of an epistemological consideration that ontological propositions must necessarily be tied to observations from a specific viewpoint, with the help of distinctions that always have a 'blind spot'. There is no *view from nowhere*. Therefore, sociological observation is only one possible way to describe or thematise the social, and as such it cannot claim a privileged status. The task of sociological theory should, therefore, not be to produce ontology, but to perform second order observations, to observe of how observations are made. This means to observe and describe how society observes and describes itself. In this sense Luhmann's position is radically constructionist, as he claims that there is no reaching behind the observations to an undistorted reality. This, by implication, also means that Luhmann cannot claim a privileged position

other assumptions and concepts around which the theory is constructed. Social systems are by definition systems operating on the basis of communication, i.e. the processing of *meaning*. These social systems are furthermore claimed to operate in an autopoietic and self-referential way. That social systems are autopoietic means that they are themselves producing the elements, the communicative events, upon which they continually renew their processing in a recursive manner. The fact that social systems are self-referential means that they can observe themselves and make themselves and their relations to their environment the object of their own processing.

Social systems are characterised by having to constantly distinguish themselves from their environment (Luhmann 1984: 25-29). They must at any time be able to specify what belongs to the system and what to the environment. This is necessary because the world as such is infinitely complex, and no system can manage that kind of complexity without losing its identity. Hence, if a system is unable to reduce its own complexity to a level below that of its environment by constantly selecting what it considers relevant, internally as well as externally, then it ceases to exist.

In the understanding of how social systems maintain themselves, Luhmann has made the concept of *autopoiesis* central. That a system is autopoietic means that it creates, by itself, the elements of which it is built in a recursive manner. An operation by any system takes its previous operations as a point of departure. In this way autopoiesis means that systems are *operationally* 'closed', they cannot 'import' elements from their environment. It does not mean, however, that systems are *causally* closed, that they cannot be influenced by events in their environment. However, the events of the environment are always brought into the operations of a system via its own observations of the environment in a selective manner. This means that events are always observed by means of the distinctions a system has at its disposal. It 'sees' the world according to its own idiosyncratic criteria, not necessarily as the world (or other systems) 'really' are in any essential sense. As such, autopoietic systems construct not only themselves, they also 'construct' their environment through their own distinctions, and in a sense 're-create' the environment within the system, although this reconstruction will typically have a rather limited bandwidth compared to all the phenomena in the world that could potentially be observed.

Observation, First and Second Order

The observations of social systems are performed through binary distinctions or 'forms' with two sides. Observing through a binary distinction means that one ascribes the object

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for his own approach within sociology, other descriptions can in principle be equally adequate. The criterion according to which the adequacy or success of a theoretical programme can be assessed is, according to Luhmann, its ability to *reduce complexity* (a criterion, which in a somewhat tautological or self-implicatory manner is taken from other parts of the theory as a general telos of all social systems) and the ability to manage self-reference, as a sociological theory with global ambitions inevitably will appear as object to itself.

of observation to one side of a *form*. This form also has another side, which is always processed in the observation, even when it is not 'marked'. These forms shaping observations can basically be of two types. Either they are shaped around an object or around a concept (Luhmann 1991: 24). The observation of an object specifies the object in distinction to the rest of the world, e.g. in the form apple/not-apple. Of greater analytical import are concepts (Begriffe), which are distinctions where one side is only meaningful in relation to the other side (e.g. hot/cold). Without such distinctions the world would be form-less. However, such distinctions enable observation through exclusion, they always have a 'blind spot', as it is impossible to observe a certain distinction and at the same time thematise the contingency of that distinction, i.e. that other distinctions could be selected as well. Operating with a certain distinction allows a system to make the observations possible within that distinction and nothing else. Nor is it possible when observing with any given distinction, for the system to know what this distinction does not allow it to observe. You cannot see, what you cannot see!

It is, however, possible to observe in different ways, and Luhmann distinguishes between first and second order observations (ibid: 23-24). First order observations are observations of 'something', while second order observations are observations of observations. Second order observations have the capacity to see the blind spot of a first order observation, which a first order observation cannot itself see. This does not mean that second order observations are 'superior' in any substantial sense, as they themselves have (other) blind spots. A central task for sociological analysis is, for Luhmann, to observe how (other) systems observe both themselves and their environment (sociology itself being an observing system exposed to the same limitations of observations).

The fundamental distinction for social systems is the distinction between system and environment. This must always be maintained if the system is to be maintained. When a system has reached a certain level of complexity it can also thematise the maintenance of this distinction. In doing so a 're-entry' of the distinction between system and environment occurs on the system-side of the distinction. This enables a system to establish complex relations both with itself and its environment. Systems then become self-referential, they can observe their own states and make those states the basis of new observations of themselves and their environment. In this sense systems do not work causally but recursively. And as recursive processes are contingent, such systems are not deterministic or predictable, although in some cases highly stable patterns of operations (modes of observations and selections) develop.

A central tenet of Luhmann's theory, derived from these considerations, is that a social system can only observe its environment with the distinctions it has at its disposal. As any social system only has a limited repertoire of distinctions at its disposal, there will inevitably be many things in its environment that it cannot observe, and therefore cannot know, at

least not while it observes. Complex systems develop reflexive and self-monitoring capacities, and can sequentially shift between different levels and modes of observation.

Society as Systems of Communication

A further significant and perhaps counter-intuitive premise of Luhmann's theory is the insistence that social systems and 'society' (the totality of all communication) consist solely of communications. Thereby the theory is deliberately distinguished from theoretical programmes based on other premises, for example that societies consist of physical infrastructure and/or human beings that act intentionally. Luhmann chooses to make communication the constitutive element of the social, as communication is always social, whereas physical objects and human acts are not. This, he claims, gives sociology a well defined object of investigation.

This focus on communication has the effect that Luhmann makes *meaning* the basic concept for sociology, since meaning is the medium in which communication is performed. Basically, meaning is a prerequisite for communication to take place (Luhmann 1990). Luhmann has undertaken extensive analyses of communication and meaning at the conceptual level that cannot be recounted here. But it must be noted that he uses the concepts in a very specific way, quite differently from the hermeneutic tradition where meaning is conceived as intersubjectively shared. Communication is abstractely conceptualised as a three-sided selection of information, message and understanding, and meaning is defined as a surplus of possibilities.[50] This means that in communicative processes selections must be made in each operation, which constantly fixes communication at one of many possibilities, and thereby reduces complexity.

As such, meaning is a way of expressing complexity and communication a way of managing complexity. Not all the possibilities referred to in any given meaning can be realized, that is, made the object of the next communicative selection (at the same time – sequentially more possibilities can of course be processed). Communicated meaning constantly forces the system to make selections; to actualise one possibility rather than multiple and equally possible others (but of course not always equally likely). This means that 'the social' is constituted as contingent; due to the 'double contingency' of all social activity the selections that will be made next cannot be predetermined.[51]

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[50] *"Das Phänomen Sinn erschient in der Form eines Überschusses von Verweisungen auf weitere Möglichkeiten des Erlebens und Handelns."* (1984: 93)

[51] 'Double contingency' being a theme Luhmann took from Parsons. This is seen as the dynamic and non-determinism arising from the fact that Alter and Ego are both free to act, but also dependent on each others acts. In Luhmann the issue is transposed from action theory to communication, Alter and Ego are always free to choose what they communicate, but communication must proceed on the basis of communicative contributions that are already available to be comprehensive.

Communication is for Luhmann not an act. Actions is, rather, something that is determined in communication. A meaningful communication opens possibilities (Anschlussmöglichkeiten) for further communication. However, it also forces determination, as systems cannot continue their autopoiesis from an undetermined state. To ascribe a given communicative event the status of an action and ascribe it to an actor is a way to reduce complexity, to determine communication within a more limited horizon.

This compulsion for selection (Selektionszwang) causes social systems and society to develop certain structural properties. Structures limit contingency, create expectations as to what directions communication will take and limit the possibilities of surprises. This enables systems to maintain more complex communicative processes because expectations pre-structure communication. As long as no surprises arise, the structures are perceived as solid and are thereby reproduced – which is not to say that they cannot be altered. Communication can always move in unexpected directions – and yet in a number of contexts it appears to be highly stable in the sense that expectations are mostly fulfilled.

From the phenomenological tradition Luhmann takes the problem of 'intersubjectivity', the question of how the observations of individual minds can be 'attuned' to each other, in short how 'we' (two individuals or a community) can live in 'the same' world and coordinate attention and actions. Luhmann proposes a rather radical solution to this question by excluding individual minds from society, ascribing psychic systems to the environment of social systems. According to Luhmann there are two types of fundamentally different systems that operate in the medium of meaning; psychic and social systems. The two types of systems both process meaning, they observe through the distinction between actuality and potentiality (Luhmann 1991: 26), but they are operatively closed off from each other, as consciousness and communication are located at two different levels of reality. However, psychic and social systems, in Luhmann's words, 'interpenetrate', which means that they put complexity (and the ability to manage complexity) at each other's disposal, and as such they cannot exist without each other. However, no psychic system can determine communication (because of the double contingency) and no matter what is being communicated the activities of individual minds are never wholly determined by their communicative environment. Social systems and individual minds influence each other – they are causally connected – but they do not determine each other, they are operationally distinct in separate autopoietic processes. This solution to the problem of intersubjectivity is an important motive in Luhmann's opting for a sociological theory-structure based on communication rather than on human intentionality or agency. This does not mean that 'human beings' do not intervene in and influence society. The theory instead sees a level of social reality that is distinct from – but has co-evolved with – psychic systems. These are complicated epistemological issues, all the details of which cannot possibly be explored here. The important point to bring to the analysis of specific empirical phenomena is that systems theory claims

that what has effects in social reality is what is communicated. To illustrate, concerns in individual minds that are not brought into 'social existence', i.e. not articulated, have no communicative existence and hence can have no effects on social systems. What is important to explore in relation to my cases is therefore what links or entry points are established (or not established!) between 'concerns' of members of the public and the forums where technology is shaped and regulated.

To sum up the argument so far: in autopoietic systems theory social systems are constituted by communication. All communication is social and no social system operates 'outside' communication. As such, the borders of 'society' are drawn by communication, 'society' is the totality of communication. This renders a radically different and more abstract image of society than those based on political or spatial borders. This has certain epistemological advantages, but also comes at a cost, to which I shall return later. However, not all communications and not all social systems are alike.

Interaction, Organisations, Functional Systems

Luhmann basically distinguishes between three types of social systems in modern societies; interaction systems, organisations and functional systems. Interaction systems are characterised by volatile and unstructured communication between persons in each other's presence (Luhmann 1997: 812-15). There are in all societal contexts norms and codes for how interactions 'begin', 'unfold' and 'end', and these can be very different (compare communication in a lecture theatre, a bar and a hospital). Such interactions entail expectations among the participants and severe breaches are sanctioned. Some of these expectations are intertwined with organisational and functional contexts, but the ineractional level always retains a certain level of autonomy. Therefore, interaction systems are never wholly determined by 'contextual' features.

Organisations are social systems with two defining characteristics; their autopoiesis operates via 'decisions' and participation is regulated by membership rules, which ascribe roles and role expectations to members. That organisations operate through decisions means that there may be a lot of interaction and communication among the members (and with non-members), but only decision communications define the organisation in relation to its environment and allow its operations to 'continue'. Membership rules regulates what persons belong to an organisation and which persons do not. Nor all members necessarily 'belong' in the same way, they are ascribed roles that form expectations as to their behaviour (teachers and students can all belong to a university, but are expected to do different things). However, when a person belongs to an organisation it is not the 'whole human being' that belongs, but only a section of their behaviour that is regulated through the membership. Multiple memberships are obviously the rule rather than the exception (one can be a university student as well as a political party member and a footballer).

Finally, Luhmann operates with a concept of functional subsystems, which all maintain specific functions for society as a whole. Whereas organisations are characterised by the ability to operate in 'intentional' ways, that is to make plans and pursue strategies (and observe if they reach their goals), functional systems work in non-intentional ways and unfold their autopoiesis most often in non-linguistic, formalised communications. This communication is specialised in relation to the tasks they fulfil for society in general, and is characterised by a combination of universality and exclusivity. A functional system, is so to speak, 'responsible' for all the communication within its domain, but only within its specific domain. Functional systems cannot replace or carry out tasks for one another.

In addition to these three fundamental classes of social systems, Luhmann, in his later writings, adds a fourth category, that of 'protest movements' or social movements. These cannot be adequately theorised with the tri-partition of interaction, organisation and functional systems, as they neither presuppose actual co-presence, nor is membership regulated (you 'belong' if you sympathise). They can have organisational characteristics, but according to Luhmann this does not really catch the essence of their societal role and effects. Protest movements are clearly not functional systems either, as they have no well-specified code that allows them to maintain functions for the rest of society. Instead they seek to criticise 'society' as if they were themselves outside of society. They seek to influence the responsible, without wishing to take over responsibility themselves.[52]

It is a central assumption of systems theory that the three kinds of social systems are structurally coupled, they put complexity at each other's disposal, but they are at the same time operationally autonomous. They are conditioned but not determined by each other.

Evolution and Societal Differentiation

Luhmann's theory is explicitly evolutionary. He claims that in the modern era a historical transformation from hierarchical-stratified to functionally-differentiated societies has taken place, and that functional differentiation or 'poly-contextuality' is now the dominant form-principle of modern societies. Earlier societies consisted of many 'identical' units, which worked in similar ways, parallel but independent of each other. Thes units were self-supplying with the elements they required for their reproduction, both materially and ideologically (farms, villages etc). Societies were ordered hierarchically, with a monarch or the

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[52] This does not mean that protest movements do not serve any function for modern societies. According to Luhmann they help relieve a 'deficit of reflection' that emerges as a result of the mutual intransparency between the different functional subsystems: "*Mit diesen besonderen Merkmalen leistet die protestierende Reflexion etwas, was sonst nirgends geleistet wird. Sei greift Themen auf, die keines der Funktionssysteme, weder die Politik noch die Wirtschaft, weder die Religion noch das Erziehungswesen, weder die Wissenschaft noch das Recht als eigene erkennen würde. Sie stellt sich quer zu dem, was auf Grund eines Primates funktionaler Differenzierung innerhalb der Funktionssysteme and Selbstbeschreibungen anfällt. Sie ist auch nicht darauf angewiesen, daß diese Gesellschaft irgendwo repräsentative und verbindlich beschrieben werden kann. Sie kompensiert deutliche Reflexionsdefizite der modernen Gesellschaft – nicht dadurch, daß sie es besser, macht; wohl aber dadurch, daß sie es anders macht.*" (Luhmann 1991: 153).

like at the top of society, ruling and representing it in its entirety. Functional differentiation, on the other hand, means that different societal tasks are delegated to specialised subsystems, which serve specific needs for all of society. Every subsystem takes over a certain function of the social totality, which enables them to deliver still more specialised performances.

Images and concepts of societal differentiation have been a major part of sociological theorising since the discipline's conception. In all the classics one finds descriptions of general tendencies towards differentiation and the following problems of social integration (see Schimank 1996 for an introduction and overview). However, it can be argued that the theory of differentiation finds its most radical formulation in Luhmann. Here it takes on the character of a general description of modernity, which is not tied to any specific national context. Historical specificities and institutional arrangements may vary, but Luhmann is more interested in the general traits common to modern societies rather than the peculiarities (Schimank 2003b). To take one prominent example: science everywhere is in principle loosened from religious worldviews and need only consider 'fact-' or 'truth-problems', not questions of faith, justice etc. This has enabled substantial progress (especially) in the knowledge of physical phenomena. But it has also meant that questions pertaining to 'the good life' have been excluded from scientific consideration (van den Daele 1987: 405-409). As such, it is a specialisation, which is at the same time a curtailment of the domain of validity of scientific propositions. In the same way a legal system has developed which can only judge whether actions are legal or illegal, not whether they are profitable, loving or popular. According to Luhmann this means that the legal system has become positive and therefore uncoupled from more informal moral feelings. The same types of developments can be noted for a number of other functional domains.

How many and which subsystems have developed is for Luhmann an empirical question, not – as for Parsons – an analytical one. The central functional subsystems of modern society (following Luhmann 1986) are the economic system, the legal system, science, the political system, religion and education. These subsystems all maintain central and indispensable functions for modern societies: the economy allocates resources, the legal system makes normative decisions and stabilises the normative order, the political system makes collectively binding decisions, science produces truths, religion delivers a cosmology and the educational system distributes career opportunities.

This differentiation has occurred through a long historical process. According to Luhmann there is no plan or intention behind this process, nor is it causally determined. There is a good deal of contingency in societal development, and modern societies are the result of many small steps of trial and error that have led to a relatively stable order (Luhmann 1997: Chapter 3.1). Luhmann refers to a neo-darwinistic understanding of evolution as a process of three elements; variation, selection and retention (ibid: 416, 425). Since there is no causal determination, that is no evolutionary step necessarily leads to the next, it is not possible to

predict what future developments society will undergo (except that Luhmann seems to think that further differentiation and evolution is inevitable (Schimank 1996: 181-84, Joas 1992: 336)). Due to the immense complexity of these inter-systemic relations and their polycontextuality, it is not possible to steer the development of 'society' as such, or even just sections of it, in any meaningful sense of the word.[53]

Codes and Programmes

The differentiated subsystems are characterised by high but limited performance. This means that they are developed to handle high complexity within clearly delimited domains. One of the ways this is managed is through the development of symbolically generalised media. These are special binary codes, which have a functional relation to the tasks the subsystems perform. The meaning of the codes is well defined and relatively immutable. This gives the systems a temporal advantage in the handling of complexity. For instance, the economic system works with the code paid/not paid, which establishes well-defined expectations as to what payment involves. In any given economic transaction one does not have to define what payment means, only whether it takes place or not. Symbolically generalised media reduce complexity, since the systems only need to consider a specific code and can ignore everything that does not relate to this code: everything else can be relegated to the environment. This allows essential communication to take place faster. For instance, in Luhmann's interpretation scientific communication need only consider whether a theory or proposition is true (or verified), not whether it is just, beautiful or profitable.[54] The legal system, correspondingly, need only to decide whether an act is in conflict with the law or not, not whether it is true or paid for – and not even if it is morally acceptable. Parallel to the development of these codes more specific 'programmes' are established. The programmes designate how the code-values are ascribed in specific instances. In science, theories are programmes that help decide which communicative events are to be considered 'true' and hence the basis of further communication, and which are false and thereby uninteresting. In the legal system laws are the programmes, in the economic system prices.

According to Luhmann these differentiated subsystems have all achieved a state of operative closure. This means that their internal communication only relates to and can only relate to itself. Scientific communication can only deal with questions of truth and is more or less incapable of communication in other codes or on themes. However, these are complicated issues, because while the systems are operationally closed off from each other, they are also mutually dependent on each other's performances. There are relationships of both independency and interdependency (Willke 1987: 4). One could say that autonomy and de-

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[53] Because of this, Luhmann has been criticised for too pessimistic an assessment of the possibility of performing any kind of (political) steering in modern societies (e.g. Scharpf 1987).

[54] An image very different from those drawn by the authors of post normal or mode 2 science as recounted in the last chapter.

pendency are two distinct dimensions in the relationship of the functional systems to their environment (Schimank 1996: 166). The functional systems are autonomous in the sense that they themselves decide what communicative events are to be selected for further processing and in what way they are to be processed, but at the same time this processing is dependent upon the presence of certain conditions ensured by the presence of other systems and human consciousness. On the one hand, the systems can only work in their own code, on the other hand a "minimum of common relevant environmental conditions" must be ensured (Willke 1987: 4). Scientific communication is autonomous in that it only takes place in relation to existing science, which is developed in the medium truth. On the other hand it is dependent upon the allocation of resources, that research is not prohibited, the presence of trained scientists and so on, just as other systems depend on the production of scientific knowledge.

The functional systems are clearly not only dependent upon each other's performance but also on organisations. All functional systems are underpinned by organisations, but where the functional systems are defined by their codes and can only operate on the basis of these, the contrary is the case for organisations. They may be primarily affiliated with one functional system, for example research organisations with the scientific system, courts with the legal system and political parties with the political system. However, an organisation cannot allow itself to be blind to other codes as functional systems are. In the systems theoretical approach there can be no 'intersystemic codes' or de-differentiation between codes. However, this does not mean that organisations cannot, indeed they must, alternate between different systemic codes and references, just as interactions and individuals can move freely between functional domains.

This extremely brief and simplified introduction to the abstract fundamentals of autopoietic systems theory cannot of course do justice to the complexity of the theory. In the following I shall expand on some aspects of it, whilst at the same time narrowing in on the most pertinent issues for the current topic. This will take place with two purposes in mind, namely to explore what implications this theoretical programme has for the issues being investigated in the thesis (i.e. how can controversies over biotechnology be interpreted within this theoretical framework and what can it tell us about the conditions for establishing increased 'public involvement') and how some of these basic assumptions and modes of observation can be turned into pertinent questions to ask of empirical material (what to 'look for' in the cases when observations are grounded in this theoretical paradigm). What can a systems theoretical approach tell us about the way in which modern societies deal with risky technologies? As a starting point, how 'technology' and 'risk' are understood within this paradigm must be specified.

Systems Theory and Technology

When studying the interaction between a specific strand of technological innovation and the rest of society, it may seem odd to take as a point of departure a theory that deliberately claims that society exists of communication alone. This means that what is normally understood by technology, the material substance and installations, which enable and shape human actions, is relegated to the environment of society.[55] The society, or parts of it, can then observe and communicate about technology, but most of what is considered technology in common language is external to society. There is no 'technological system' parallel to the scientific system or economic system that maintains well defined functional tasks, just as there is no well specified code for technology. Nor is it sufficient to understand technology as the opposite of nature (as something artificial) (Luhmann 1997: 519) or as opposed to humanity (as something alienating) (ibid: 521), if one wants to analyse the relationship between technology and society.

Instead Luhmann suggests we understand technology as 'functioning simplification' (funktionerende Simplifikation, ibid: 524) or 'causal simplification' (Japp 1998: 228). This entails considering technology as one side of a distinction between causal simplification and causal complexity. Technology (that works) reduces complexity for an observer.[56] When technology works a number of things in the environment can be ignored, because the things that are focused on can be controlled and do not provoke surprises. The world is less complex and attention can be directed elsewhere. In this sense technology becomes structuring and coordinating for action: "*Was funktioniert, das funktioniert....Darüber braucht man kein Einverständnis mehr zu erzielen. Technik erspart auch, soweit sie Abläufe koordiniert, die stets schwierige und konfliktträchtige Koordination menschlichen Handelns.*" (Luhmann 1997; 518).

Technology should, according to Luhmann, be considered as a product of society's co-evolution with its physical environment, which at the same time creates dependency and freedom for society. In this regard co-evolution means that "*...die Gesellschaft sich selbst in einer nicht rational vorausgeplanten Weise von der Technik abhängig macht, indem sie sich auf sie einläßt.*" (Luhmann 1997; 523). Technology is not just a means by which society adjusts to its environment.[57] How technology should be formed and observed is decided 'within' society. However, this does not happen completely at the will of social systems as they need to observe the material causalities of the environment. Co-evolution means that society and en-

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[55] As such the approach is very different from what can be considered the dominant paradigm in science and technology studies – Actor-Network Theory (ANT) – which seeks to break down any epistemological or ontological distinctions between society and nature and to explore how the two are intimately interwoven (see e.g. Latour 1993). I cannot explore the differences between systems theory and ANT here.

[56] "*Die maßgebende Unterscheidung, die die Form "Technik" bestimmt, ist nun die zwischen kontrollierbaren und unkontrollierbaren Sachverhalten. Extrem abstrakt formuliert, geht es also um gelingende Reduktion von Komplexität. Es mag im übrigen geschehen, was will: die Technik liefert die beabsichtigten Ergebnisse.*" (Luhmann 1997: 525).

[57] "*Technik ermöglicht keine immer bessere Anpassung der Gesellschaft an ihre Umwelt, wie sie ist. Sie dient mit der Vermehrung von Optionsmöglichkeiten der Entfaltung der Eigendynamik des Gesellschaftssystems.*" (Luhmann 1997: 523)

vironment have a common history. That is why previous technological decisions can be extremely difficult to change without causing great upheaval in large parts of society (see for instance van den Daele 1993).[58] Therefore, technological decisions become of central interest to the political system, which is where collectively binding decisions are made according to the self-description of modern society.

This is indeed a very abstract definition of how technology is to be understood, and there are obviously numerous alternative and more specific conceptualisations of technology in the sociological literature. The strength, however, of this conceptualisation is that it makes it clear that, for a sociological observation, there is no materially immanent criteria to tell us when a technology is 'working' or working satisfactorily. To decide whether a technology can be considered as working in a satisfactory way, that is whether it can reduce causal complexity to a level that excludes surprises, or whether its workings (including surprises) should be considered acceptable, is a matter of observation. This observation depends on who observes, and through what distinctions the observation uses. The sociological analysis of technology – and technological controversies – must then focus on how society and its parts observe any given technology, whether conceived of as functioning or non-functioning, and on what criteria this evaluation is based. It seems obvious that there are a number of different and often conflicting perspectives on biotechnology. From a systems theoretical point of view none of these are inherently right or superior, but they all contribute to societal communication about technology – and some achieve more resonance than others. The observer-dependency in the assessment of technology is also central to the systems theoretical analysis of risk as a social phenomenon, which as a mode of observation is of increasing importance for the dynamics of modern societies.

Risk and Danger

For Luhmann the concept of a *risk society* does not have an iconic status as, for instance, in the writings of Ulrich Beck (Beck 1986) for whom the management of risk becomes *the* characteristic trait of modern society. But the increased prominence of risk discourses indicates that risk has become a significant mode of societal self-observation and description, that individuals and organisations have become aware that virtually all decision-making is in some sense risky. Now what does this mean?

The basic *problematique* is that individuals, organisations, and society at large must cope with an unknown future in the present. It is necessary to make decisions with imperfect knowledge in the present and live with the consequences in the future – even if things do not turn out as expected (Luhmann 1991: 2-3). In a sense this has always been the case. How-

[58] An obvious example: it was contingent (and evolutionary/incremental) that modern societies 'chose' to rely heavily on private cars. However, now that cars are central to modern life, it is extremely difficult to change that reliance, even when all major cities are seriously congested and the environment is rapidly degrading as a consequence.

ever, in contemporary societies the potential scope of action has grown tremendously as a result of increased knowledge, the removal of the normative barriers of tradition, and technological progress. This leads to a growth in contingency (you can do this, but also something else), which requires decisions and, at the same time, an increased awareness of this contingency. Due to the modern, disenchanted worldview presupposing that events are linked causally and an increasing reflexive capacity, it becomes clear that many undesirable states of affairs must be attributed to past decisions, not to 'God', 'Destiny' or pure arbitrariness. We have learned that decisions often have other or additional consequences than those expected ('side-effects'). In an abstract sense the management of risk therefore does not simply require better objective knowledge, but has to do with the way observations and selections are ordered temporally. What may in the present seem an acceptable risk may in the future entail consequences that were not even considered in the risk assessment. Or it may not. Any decision can in retrospect be considered as reckless or excessively cautious depending on what has happened. And both are in a sense risky. In the one case, one must live with damages and losses; in the other, opportunities that could have been realized were missed (Luhmann 1991: 29). But since the future is unknown, decisions must be made more or less blindly. In Luhmann's jargon this is formulated in the image that recursively operating systems move "backwards into the future" (Luhmann 1991: 43). All experiences are past experiences, but they guide the choices for future actions.[59]

This, of course, means that all actions concerning an abstract consideration are risky. The problem regarding the management of technology is that more knowledge creates more contingency, rather than more safety. Therefore, it is to be expected that more knowledge also creates more risk awareness, rather than less. This does not mean that damage is not better prevented through better knowledge, but since multiple decisions about prevention are available, they become risky in an abstract or second order sense as well. In this sense risk as a social phenomenon has a self-reproducing effect – it becomes reflexive (Luhmann 1991: 39).

Thus, no action can be risk free – or given the way that modern societies are structured, risk-taking is inevitable. The question is therefore what risks should be taken and which avoided as well as how this can be decided collectively. One of the things Luhmann's perspective makes clear is that even when something goes wrong (unanticipated/unwanted consequences), decisions may well have been right in terms of the existing knowledge, information and prevailing criteria of rationality. However, this is a situation that is difficult to accept and hence it is often necessary, ex-post, to find reasons for mishaps and preferably to place guilt (Bonß 1995), even if this means focussing on certain causal relationships and whilst ignoring others (some of which are perhaps not even observed, known or understood).

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[59] As is illustrated nicely in the saying that generals are always preparing for and fighting the last war.

When modern societies to a growing extent consider the future as risky, this is understood in terms of the distinction (or 'form') likely/unlikely. The future appears as open but demands definition, a reduction of contingency. The future can thus be interpreted in the present in the form 'likely/unlikely', but it cannot appear as a likelihood:

> *"Mit der Form des Risikos nutzt man ... gerade die Unbestimmtheit der Zukunft, ja gleichsam die eigene Unwissenheit aus, um die Gegenwart of Formen zu bringen, die durch künftigen Gegenwarten bestätigt oder auch widerlegt werden können. Die Zukunft, die ja nur auf die eine oder andere, jedenfalls aber nur auf eine bestimmte Weise Gegenwart werden kann, wird in eine fiktive Form gebracht, die als solche nie eintreffen wird, nämlich die Form wahrscheinlich/unwahrscheinlich."*
> (Luhmann 1991: 80-81)

To communicate about something in the form of probability is then a way to manage uncertainties in the sense that what is unknown is changed into a form that allows further operations to take place.

What I consider to be the primary value of Luhmann's conceptualisation is that it makes very clear in theoretical terms why risks of various kinds tend to induce a social dynamic. This dynamic is not determined by the physical characteristics of the risks in question, but is due to 'society-internal' communication. The dynamic induced by decisions derives from the fact that in a differentiated society, decisions are not made in one place or according to the same logic. Decisions are made in different subsystems and organisations, each operating according to their own logic. This means that what in one context appears as an acceptable risk – or perhaps not as a risk at all – may in other contexts seem very dangerous. This is particularly clearly stated in Luhmann's conceptualisation of risk as a form with two sides: Risk and danger.

Initially, one might consider the intuitive opposite of risky to be 'safe'. But since safety as such can never exist, it will only be an empty opposition to risk – something that can be aspired to, but never achieved. Instead, Luhmann proposes contrasting risk with danger (Luhmann 1991: 30). Risk is, then, always the result of decisions, whereas danger denotes events in the social environment to which one is (involuntarily) exposed. In Luhmann's theory, this links the risk/danger-distinction to the system/environment-distinction, in the sense that whereas risk is contingent (dependent on systems operations or decisions), danger is a quality of the environment that the system needs to cope with, but over which it has no (direct) influence.[60]

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[60] Wolfgang Bonß has expanded on the distinction between risk and danger and claims that it is also necessary to talk about second order dangers. These dangers are the incremental result of a number of risky decisions, but add up to a danger scenario where it is no longer possible to causally establish who is actually responsible for the problems. Hence, the risky activities of individual actors are transformed into societal dangers that no longer allow decisions as such (Bonß 1995).

Risky behaviour is therefore thought to provoke social conflict, as what, for some, are decisions (acceptable risks) made according to the decision maker's knowledge, criteria of rationality and normative standards, are experienced by others as dangers over which they have no control, but which may still have consequences for them. This often leads to a situation where those making decisions and those potentially affected by them have very different interpretations of both the 'objective' facts at stake and the criteria of acceptability. There are two major reasons why those who are affected by decisions will often evaluate them differently from those who decide: 1) they are not under pressure to make decisions, and 2) they are unlikely to benefit in the same way from whatever is decided as those making the decisions (Luhmann 1991: 77). Therefore it is to expected that "... *sich unterschiedliche Formen sozialer Solidarität entwickeln je nach dem, ob die Zukunft unter dem Aspekt von Risiko oder unter dem Aspekt von Gefahr wahrgenommen wird.*" (Luhmann 1991: 112).[61]

A distinctive characteristic of Luhmann's theorising is that it views specific problems from the perspective of 'functional equivalents'. However, from his discussion on risk it becomes clear that the conflicts raised by the production of physical risk have, in a sense, a structure different from other social conflicts, and cannot therefore be handled by the standard repertoires evolved by the existing functional systems. Basically, risk problems cannot be ascribed to one functional system (or a specific type of organisation in particular). As a *social* problem, risk emerges everywhere, and decisions must be made on the basis of incomplete knowledge about their consequences. For instance, physical risks from technologies cannot be adequately dealt with in either the economic or the legal systems, because probabilities of physical risks run counter to their internal logic. The economic system is furnished to handle the scarcity of goods, not the distribution of 'bads', as Ulrich Beck puts it. To the extent that technological innovations produce physical risks as by-products, these must be externalised as economic costs. This raises the problem that no proper market exists for, for instance, environmental values. Neither can nature or human health be considered normatively qualified as commodities.

The legal system also has difficulties with handling physical risks adequately without entirely blocking innovation and economic activity – which would go against the ideal of the liberal social order the legal system is programmed to uphold. This is due to the fact that the judicial system is based on 'norms' that must be sanctioned whether damage is provoked or not. Only what is illegal can be punished, but when the future is unknown it is difficult (indeed impossible) to know which innovations might produce unwanted results. However, innovations cannot be rationally forbidden, if it is unclear whether damages might occur or not. The basic issue is that whereas the breaking of norms can only be sanctioned subsequent to their violation, risks need to be dealt with prospectively, through

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[61] Here cultural theory argues the opposite. It is the form of solidarity that influences what types of risk and uncertainties are selected for attention (Douglas 1992, Rayner 1992). See below.

planning and precaution. One can, of course, make individuals and corporations liable for their actions and products as under liability law, as seen especially in the US. Yet from the perspective of normative regulation this is somewhat paradoxical, as sanctions are then made dependent on the occurrence or non-occurrence of adverse effects of activities legal at the time they are performed (Luhmann 1991). Authorities cannot (rationally) both allow the release of GMOs into the environment under certain specified conditions and then subsequently prosecute unforeseen events where actors have adhered to the conditions laid out for such releases.

The systems theoretical way of conceptualisation of risk therefore invites observations on how the uncertainties involved in decision-making (in principle in all domains, but perhaps in particular with regard to technologies entailing physical risks) can be and are 'shifted' between the different functional domains via structural couplings. For instance, the legal system operates within limit values, which the scientific system is responsible for determining, not the legal system itself. The legal system can make selections on the basis of whether limit values are adequately observed, not whether actual damages occur. This means that if damages occur when limit values are observed, this will lead to revisions of the limit values (through scientific investigation), and not to a shift from legal to illegal (i.e. learning rather than sanctions). Likewise, the scientific system can shift the responsibility of whether a given strand of research should be pursued or not to the political system, and thus does not need to occupy itself with the question of whether or not the application of knowledge finds acceptance in its environment (Bora 1999: chapter 2.3). In the 'ideal' situation, i.e. in the self-descriptions of the functional systems, structural couplings like these should be relatively tight, so that as many uncertainties as possible can be absorbed through the performance of mutual interpenetration of the systems (German: Leistungsbeziehungen, ibid). Many of the issues leading to controversies over risks can be understood as insufficient 'programming' between the different functional systems, where structural couplings are (too) loose and the systems concerned cannot absorb sufficient uncertainty for each other. [62,63]

In my opinion there are two things that can be learned from Luhmann's analysis of risk, which are often conceptually less clear in other sociological writings on the subject. First, there is no position in society from which risks can be considered in the 'right' way. Multi-

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[62] "*Die Politik etwa ist oft nicht mehr in der Lage, über die Akzeptabilität der Technik zu entscheiden und dies in Gesetzform zu bringen; die Wissenschaft wird von innerwissenschaftlicher Kritik darauf aufmerksam gemacht, daß ihre Kausalmodelle zu einfach waren, daß sie es im Falle von Technikentwicklungen mit eigensinnigen Verläufen zu tun hat; Grenzwerte werden als "politische" Grenzwerte verstanden; Protestbewegungen formieren sich, die mit "semantischer Politik" dafür sorgen, daß da Thema "Risiken der Technik" nicht von der Tagesordnung verschwindet; die Wirtschaft weigert sich, allein die Haftung für mögliche Schäden in unbegrenzter Höhe zu übernehmen, wenn die Technik insgesamt für gesellschaftlich förderungswürdig gehalten wird.*" (Bora 1999: 83).

[63] This process, where the functional systems mutually absorb uncertainties on behalf of each other, is the equivalent of what Ulrich Beck, from a different theoretical starting point, and with clearly normative intentions, describes as 'organised irresponsibility' (Beck 1988).

ple perspectives on the same object-matter are inevitable in a poly-contextual society. The distinction between decision-makers and those affected elegantly demonstrates why this is very likely to induce social controversy. Second, since risk is about making decisions with incomplete knowledge, there can never (or very rarely) be a risk free-decision. But risks can be transformed from one form to another, and this becomes particularly clear in a constructivist perspective that does not privilege physical risks over 'social' risks. For instance, the risks of releasing GMOs into the environment can be transformed into the political and economic risks of handling a moratorium or perhaps a trade dispute, as is clear at the time of writing in the controversy between the EU and the US. Whether such a risk transformation is preferable again depends on the mode of observation. However, it can be argued that where the systems theoretical framework is strong in pointing out the challenges from increased risk awareness in modern societies, it has less to say about how variations are actually dealt with.

Risk Cultures – Systems Theory and Cultural Theory

As mentioned at the beginning of this chapter, there are competing and complementary perspectives to the systems theoretical paradigm in the sociology of risk, which has also provided interesting insights relevant to this work. However, in terms of theorising risk as a genuinely sociological phenomenon, there is arguably only one other paradigm after systems theory. This is the cultural theoretical programme initiated by Mary Douglas and developed by a number of researchers.[64] This programme has quite different roots from systems theory, but nonetheless the two programmes have certain points in common. On an abstract level, both are contructionist and structural (cf. Renn 1992), they argue that the observation and management of risk is selective and that this selectivity is related to social structures. "Cultural theory argues that risks are defined, perceived, and managed according to principles that inhere in particular forms of social organization." (Rayner 1992: 84) and in the following I shall explore how Cultural Theory may complement the systems theoretical approach to risk.[65]

I have argued that risk taking in general is unavoidable in modern society. When available knowledge does not allow the prediction of all consequences, a decision-maker is in principle faced with a principally 'symmetrical' situation of either taking a risk (and eventually

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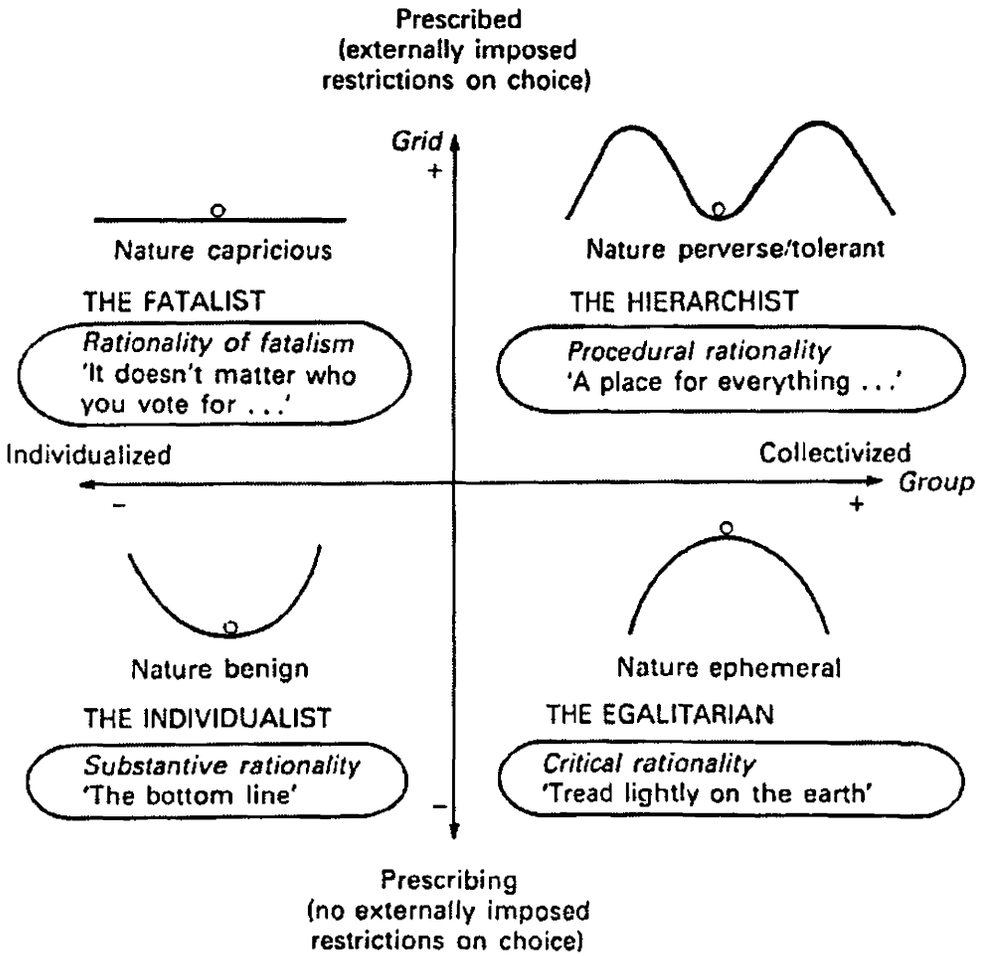
[64] In addition to researchers explicitly laying claims to working within the cultural theoretical paradigm I also assign the work of, for instance, Brian Wynne and colleagues to this approach. Wynne himself admits a strong resemblance between his approach and the cultural theoretical programme, although he claims not to share all its assumptions (Wynne 1992: 291). Many of the ideas mentioned here are shared by researchers taking a 'cultural approach' to risk, even if they do not share the more structuralist assumptions of cultural theory.

[65] It can be argued that the systems theoretical paradigm is more self-reflexive (it emerges as an object of observation for itself), than the cultural theoretical paradigm. Cultural Theory is not observed by itself as either hierarchical, individualist, egalitarian or fatalistic.

absorbing the consequences) or abstaining and living with the knowledge of a lost opportunity. In order to be able to make a decision (which is not seen as wholly arbitrary) some kind of asymmetry must be present, some preference for one selection rather than another. The mechanism facilitating such a selection bias can in general be labelled 'culture' (Japp 1996: 109). The systems theoretical framework, however, can only predict that such cultures must be available for decision-makers, not what they may be. Here, according to Japp, systems theory can profitably be extended using perspectives from Cultural Theory. The cultural theoretical paradigm claims to be able to explain and classify different risk cultures according to only two variables, 'grid' and 'group'. *Grid* pertains to the social rigidity of the organisation (how regulated are social interactions?) and *Group* to the level of solidarity within organisations (how open or closed are organisations to members joining or leaving?) When these two variables are cross-tabulated the following four 'cultures' emerge.



Source: Schwarz and Thompson 1992: 9

This paradigm delivers a parsimonious typology, which I believe to be quite useful for exploring some of the incommensurabilities often observed in technological controversies,

and which seem compatible with the systems theoretical approach. Systems theoretically the cultures can be described as expectations of expectations (Erwartungserwartung) that are '*typical*' in certain kinds of organisations (they are located at the level of organisations, where decision are made, not at the level of the functional systems). They are, so to speak, patterns of self-description that allow organisations to maintain certain modes of observations as stable over time.

Cultures can be understood as 'ideologies', 'world-views' or 'biases' that develop asymmetries or preferences, and which enable organisations to select what is relevant information in a given situation, and what is irrelevant, that is what should be considered non-information. When it comes to managing risks, biases therefore allow organisations to make decisions in situations of incomplete knowledge, to absorb uncertainty into their operations and to form expectations about both themselves and their environment. The whole point of Cultural Theory is that organisations do this in different ways, according to which culture is dominant.

> *"Sie* [cultures] *liefern die kulturellen Gründe für Zurechnungen auf Motivation und Erfolgserwartungen, die in Verbindung mit Wertbindung und Verantwortungsübernahme Bedingungen für Risikobereitschaft beziehungsweise Risikoaversion je relative spezifizieren. Kulturelle Muster sind Kommunikationsspeicher für Asymmetrien, die, ohne aufwendige Informationsverarbeitung, die eine identische und allgemeingültige Objektwelt voraussetzt, 'abgerufen' werden können. Als solche sind sie eingebaut in* ways of life." (Japp 1996: 121)

Cultural Theory has been advanced as an alternative framework to the psychometric approach discussed in chapter I for understanding the risk perceptions of individuals. However, I will argue that its main strength lies in its analysis of organisations. As such the cultures can be seen as 'typical' for different types of organisations. Ideal typically the hierarchical culture is found in bureaucracies (government agencies, armies etc), the individualist culture in market actors (business firms) and the egalitarian culture in social movements, although this is somewhat stylised. Organisations based on particular cultures develop distinct expectations of 'appropriate' behaviour and typical asymmetries for observing themselves and their environment. In doing so they draw upon fundamental social forms (Vergesellschaftungsformen): coercion (hierarchy), exchange (individualism), solidarity (egalitarianism) and marginality (fatalism) (ibid: 110-10). Some of the most characteristic patterns of biases for the three major cultures are listed in the following table.[66]

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[66] Among cultural theorists 'fatalism' is often considered a residual culture, and is included in the framework for logical rather than empirical reasons. It can describe the attitudes of marginalised individuals, but it does not have any empirical counterparts at the organisational level. Marginalised individuals tend not to organise, and it is difficult to maintain an organisation on a fatalist cultural basis. Hence, 'marginalists' seldom exhibit political activity, although they can be understood as a 'silent majority' (Rayner 1992: 89-90).

	Hierarchy	Individualism	Egalitarianism
Cultural 'Central-bias'	Ritualism	Pragmatic materialism	Fundamentalism
Criteria of rationality	Procedural	Substantial	Critical
Dominant view on resources	Scarce	Abundant	Exhaustive
Dominant perception of knowledge	Complete and organised	Sufficient and temporally adequate	Incomplete but holistic
Meaning of learning	Anticipation	Trial and error	Trial without error
Desirable system characteristics	Controllability (through inherent order)	Exploitable (through inherent elasticity)	Maintenance of stock (because of inherent fragility)
Concept of fairness	Equality before the law	Equality of opportunity	Equality of outcome
Dominant temporal perspective	Balancing short and long term	Short term	Long term
Extraordinary risks	Loss of control	Breakdown of markets	Irreversible/catastrophic developments
Models of consensus	Hypothetical consensus (through representative institutions)	Implicit consensus (revealed preferences through markets)	Explicit consensus (expressed preferences through discourse)

Adapted from Japp 1996: 122-24

The grid/group typology was originally developed in an anthropological context of pre-modern, segmented societies, and it therefore seems pertinent to ask to what extent the model is adequate for the description of modern, functionally differentiated societies (Gill 2003: 33-34). It does not seem reasonable to expect that such a close linkage between social structure and ideologies as suggested by cultural theory is possible, as the structural features of modern societies cannot be exhaustively described by just these two (or any two) variables without ignoring too much complexity. I do think, however, that this framework can be useful when observing many contemporary controversies over technologies as (at least partly) grounded in diverging framings not just of the technologies in question, but also of the surrounding institutions, some of which can be ascribed to diverging cosmologies.[67] It must however be kept in mind that these descriptions are ideal typical. In some cultural theoretical work one can observe a tendency to confuse the ideal typical typology with 'real types' (Gill 2003: 35). I propose to apply the Cultural Theoretical model exclusively as an ideal typical classification, which can be used to explore and make sense of the empirical material. It is not expected that these cultural biases will necessarily be found empirically in

[67] Hence the problem of incommensurability expounded by Pellizoni (2003a) (see Chapter II).

such distinct forms, but I assume that the cultures developed in the grid/group typology will represent some of the major differences between central 'types' of actors in technological controversies, albeit in various composite forms. Therefore, the cultural theoretical framework can help us to understand why some organisations are willing and able to absorb some uncertainties and not others, as well as why they are willing to take the responsibility for some decisions and not others.

The Cultural Theoretical perspective also directs out attention to the fact that the kind of procedures being studied – which are meant to mitigate technological controversies – must devise ways not only to operate with a spectrum of functional codes, but also to mediate between the different cultural modes of observation on technological choices. This is especially so if such procedures are to facilitate the creation of trustful relations between actors with diverging worldviews.

Trust as a Sociological Phenomenon

It is often claimed or hoped that more trustful social relationships will be the product of increased public involvement in controversial technological domains. It is my impression, however, that what is actually entailed by the concept of trust is not always clearly defined. Often, empirical investigations rely on what I consider as too individualistic (psychological/psychometric) a concept of trust, perhaps because empirical research on 'trust' is often carried out as survey research. However, I believe that a systems theoretically inspired approach can provide important additions to more individualistic approaches. I will therefore devote a section to exploring the treatment of this topic more closely within the present theoretical approach.

During the 1990s *trust* was increasingly found on the social scientific agenda in relation to a number of contexts. In the study of technological controversies the idea of a trust deficit gradually replaced the perceived knowledge deficit as one of the explanations of perpetual controversy. However, although the word trust is quite mundane, it is by no means self-evident what it actually means in sociological terms.[68] This has sparked a growing interest in understanding both on the theoretical and on the empirical level how trust can be understood and how it operates. However, as early as 1968, long before the concept of trust became topical in sociology, Luhmann published a book on trust understood as a mechanism that reduces social complexity, which in my opinion is still relevant for contemporary discussions.

One of the major merits of Luhmann's early discussion on trust was to make it clear that trust is not a phenomenon belonging to traditional, pre-modern societies. Trust is not limited to close relationships based on personal knowledge and shared values. It is not, as one

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[68] As such the shift from a 'knowledge deficit' to a 'trust deficit' seems to express a certain epistemological embarrassment – we don't know what causes public unease, so we call it lack of trust.

might think, a characteristic of *Gemeinschaft* rather than *Gesellschaft*. On the contrary, the need for trust as a mechanism to deal with the uncertainties and complexities of modern society is growing, rather than diminishing.[69] It is

> *"... nicht zu erwarten, dass das Fortschreiten der technisch-wissenschaftlichen Zivilisation die Ereignisse unter Kontrolle bringen und Vertrauen als sozialen Mechanismus durch Sachbeherrschung ersetzen und so erübrigen werde. Eher wird man damit rechnen müssen, dass Vertrauen mehr und mehr in Anspruch genommen werden muss, damit technisch erzeugte Komplexität der Zukunft ertragen werden kann."* (Luhmann 2000 [1968]: 20)

It can also be argued that different, and more differentiated, types of trust are required in modern societies. As Piotr Sztompka argues, "there are some unique features of contemporary societies that give particular salience to the problematics of trust." (Sztompka 1999: 11). The most central of these features is, according to Sztompka and clearly inspired by Luhmann, that modern society is to an increasing degree marked by purposeful action, and the future depends to an increasing degree on decisions made today. This is certainly the case with regard to technological choices, which means that: "the common people have to trust all those who are involved in "representative activities" acting "on their behalf" in the domain of government, economy, technology, science." (Sztompka 1999: 12). Sztompka goes on to argue that: "Large segments of the contemporary social world have become opaque for their members... Trust becomes an indispensable strategy to deal with the opaqueness of our social environment." (Sztompka 1999: 13). In Luhmann this is generalised to a solution to the problem of social complexity: "*Sie* (trust) *stärkt die Gegenwart in ihrem Potential, Komplexität zu erfassen und zu reduzieren; sie stärkt die Bestände gegenüber den Ereignissen und ermöglicht es daher, mit* größerer Komplexität in Bezug auf Ereignisse zu leben und zu handeln" (Luhmann 2000: 18, emphasis in original). But how can 'trust' be understood as a social mechanism, and can such considerations be made relevant for more empirical analyses? This I shall discuss in the following with reference to Sztompka and Luhmann.

First, Sztompka argues that trust can only refer to human relations or capacities, and not to natural events. This is due to the fact that trust is only necessary because others have the freedom to act differently from what we expect. For Luhmann, this is not only the reason for which trust is necessary, but also a prerequisite for trust to be formed. Personal trust presupposes that individuals possess freedom of action, since it can only be vested in someone who is believed to be in control of his or her own actions. It would make no sense to trust someone who is either completely predictable or completely random in their behaviour. We could say that a trustworthy person must have a personality. This is in a sense also the case for trust in systems. Systems must be contingent, but not completely random, in their operations, in order to both require and to achieve trust.

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[69] A point also argued by Giddens (1991) – with, I believe, some unacknowledged inspiration from Luhmann.

Sztompka goes on to differentiate between confidence and trust, and claims that confidence is due to an external attribution (one can be confident about something in a passive way and disappointment can be ascribed to agents other than oneself), whereas trust is an internal attribution (one chooses to trust someone or something and disappointments are ascribed to ones own excessive trustfulness) (Sztompka 1999: 24-25). As I see it, this is parallel to Luhmann's claim that a certain familiarity (Vertrautheit) with the world is necessary for expectations and trust to be formed in the first place. These preliminary considerations lead Sztompka to define trust in the following way: *Trust is a bet about the future contingent actions of others.* (Sztompka 1999: 25). This definition explicates the two main components of trust: a belief about the actions of someone and a commitment. It only makes sense to talk about trust if the trustee can potentially act in different ways, and trust is only relevant if something is at stake. The parallel to this in Luhmann's work is what he terms risky 'pre-performance' (riskanten Vorleistung) (Luhmann 2000: 27), which is established through an exaggeration of the available information. Things are assumed for which there is no evidence available. Hence, trust consists of both knowledge and non-knowledge, and will always, in the final analysis, be 'unfoundable' (unbegründbar) (Luhmann 2000: 31).

Sztompka also defines a symmetric 'opposite' to trust, *dis*trust, which he defines as a negative bet (the anticipation that someone will behave in a certain way, which is negative in one's own perspective). Luhmann emphasises this distinction in that he claims that trust is something which can be chosen. Hence, there must be alternatives to choose from, otherwise there would be no choice. The obvious alternative is distrust, which in an abstract sense forms a functional equivalent to trust. Distrust can also reduce complexity for a system in relation to its environment. However, it drastically reduces the capacity to act, because more information is required for someone who distrusts. Distrust also offers fewer opportunities for learning and therefore does not allow for the same degree of social complexity to arise (Luhmann 2000: 93-94).

The relationship between trust and distrust is, according to Luhmann, regulated through thresholds, which are artificial discontinuities that allow for a multitude of experiences to be evaluated in relation to a single difference. It is not easy to say when trust is transformed into distrust, but someone who is trusted usually has a certain 'credit', which, when used up, suddenly becomes distrust, even if the event triggering the transformation is not apparently all important. Since Luhmann has little specific to say about such thresholds, apart from the fact that they exist, it must be assumed that this will be an obvious subject for empirical investigation in specific cases.[70] With regard to thresholds, trust and distrust are asymmetrical, since trust is more easily turned into distrust than the other way around. According to Luhmann, this is due to the fact that trust is not codified to the same extent as

[70] With regard to the current study it also raises the question of how what may be considered a general uneasiness with technological development is linked to the acceptance of specific products and trust in specific regulatory agencies etc.

other mechanisms for the reduction of complexity, like money, truth or justice (Luhmann 2000: 118). It is also difficult to see how such a codification would occur, or what it could look like. A further reason for the asymmetry between trust and distrust is that trust in principle requires a build-up phase with many indications that a person or organisation is actually trustworthy. One proof does not necessarily justify trust. However, just one instance of misconduct can justify the withdrawal of trust, its transformation into distrust.

Trust cannot be extended unconditionally, and mechanisms are needed which allow for trust to be withdrawn when expectations are not fulfilled. This will, according to Luhmann, seldom be based on thorough assessments of whether trust is justifiable or not, since the world is too complex for that; instead, it will depend on continuously monitored symbolic indicators (Luhmann 2000: 36-37). In this sense, the establishing of trust is dependent upon situations that are easy to interpret, and even more so on possibilities of communication. This can be seen in the discussions on how to manage the risks of biotechnology. The public does not 'trust' the producers and promoters of genetically engineered food. Hence, certain control mechanisms must be installed (if GM food is to be developed). However, since what is supposed to be controlled is beyond the sensory and cognitive capacity of lay people, other symbolic signal mechanisms are also required. This is typically achieved through the institutional independency, or the mechanisms of public accountability of controlling agencies. What is noteworthy here is the reduction of complexity and 'internalisation' in social systems of the problem of trust. Most people do not understand GM food in its physical/technical sense (and they know this), yet they are convinced that they have a fairly good sense of the credibility of institutions. The physical complexities of biological processes are shifted to the social dimension, where a 'generalised' trust is upheld through 'strategic' distrust (control and surveillance mechanisms) at specific points.

Sztompka differentiates analytically between three types of commitments that the 'bet' involved in trusting can consist of: anticipatory, responsive and evocative trust. Anticipatory trust means that one expects that others will behave in a certain way, which in the case of trust will be in one's interest (and in the case of distrust will be to one's disadvantage), whether they are aware of the trust vested in them or not. In addition to such expectations, responsive trust entails an expectation that others are responsive to the trust shown them. For instance, people will take good care of things lent to them and so forth. Evocative trust furthermore entails the expectation that others will reciprocate the trust vested in them, they will return favours, and in time eventually emotional bonds will result from showing trust.

Sztompka also emphasises the close relation between trust and risk, in the sense that showing trust is equivalent to 'bracketing out' a risk; it is a way of absorbing the uncertainties of future events. If one chooses to believe the experts claiming that GM food is safe, then one no longer needs worry about this, and can direct attention towards other issues (provided there are no other reasons to object to GM food). However, this indicates a paradoxical

situation, since showing trust is in itself a risky operation. Hence, it can be argued that: "Trust copes with one type of risk by trading it for another type of risk." (Sztompka 1999: 32). Luhmann describes this as a process whereby 'outer' (system-external) uncertainties are transformed into 'inner' uncertainties, which are easier for the system to manage and absorb (Luhmann 2000).

Trust can be vested in different types of actors or systems. Sztompka differentiates between five different targets of trust: persons, social roles, social groups, procedures and technological systems (Sztompka 1999: 41-44). It seems to be stating the obvious by saying that one can place trust in persons, whether known personally or through the mass media. However, one can also trust persons qua their social roles. For instance, doctors, judges, policemen and the like are all expected to behave in trustworthy ways as a function of their role, separately from their personality.[71] It is also possible to assign trust or distrust on the basis of group membership, even if one does not know the members personally. Obviously, all sorts of stereotypes are involved here. Procedural trust is not vested directly in actors, but rather in action systems or institutions, for instance trust in the independence and fairness of courts, or trust in scientific procedures as the best way to achieve valid knowledge. One can also place trust in technological systems. This is often done without reflection and issues of trust only arise when things do not go as expected (when causal simplification breaks down). However, it is important to note that the trust placed in technological systems or 'expert systems' is not tied to technological artefacts, but relies on trust in the competence and good will of the actors operating or producing the technological systems. As such then, what seems to be trust in technological systems (which may be more based on familiarity or habit) will entail normative expectations concerning the people operating them. This is why it is important to find the element that is 'responsible' when something goes wrong, even if this entails causal simplifications unwarranted by the events (Bonß 1995: 55).

As touched upon previously, in addition to the primary targets of trust, one can also speak of secondary targets of trust or agencies ensuring the reliability of primary trust. The prime example in this context is trust in experts claiming that primary targets of trust, technological systems, are trustworthy. Sztompka talks about 'pyramids of trust' (Sztompka 1999: 47), and these are often dependent on various agencies of accountability, that is some sort of control mechanism such as the right of public assess to administrative decisions or scientific peer review. These must in turn be trustworthy in order to fulfil their functions – and in this sense trust becomes reflexive. Here, Luhmann points to another peculiar asymmetry between trust and distrust. Trust and distrust are also asymmetrical in the sense that the systems, in which trust and mistrust are vested, see them differently. When somebody trusts you, you can perceive this to be a result of you being trustworthy. However, the op-

[71] And when some do not live up to expectations, distrust may afflict whole professional groups.

posite is not likely to be the case. If somebody distrusts you, it is more likely that you will interpret this as the result of misinterpretations or insufficient communication. Neither persons nor systems are likely to see themselves as untrustworthy. However, when trust becomes reflexive, persons and systems are able to reflect upon the observation that others do not trust in them. Scientists can wonder why it is that their expertise and advice are not trusted by lay people. But even if communication is required in order for trust to be extended, trust as such cannot be directly communicated. If a person or an organisation explicitly claims to be trustworthy, this is likely to have the opposite effect. Instead, "*(u)er sich Vertrauen erwerben will, muss am sozialen Leben teilnehmen und in der Lage sein, fremde Erwartungen in die eigene Selbstdarstellung einzubauen.*" (Luhmann 2000: 80)

Sztompka notes that the various types of trust are not mutually independent. There are interactions between personal and positional trust, and furthermore there appears to be a spillover effect between different social institutions. This is, as discussed earlier, clearly demonstrated in the effect of the BSE scandal on the confidence expressed in other experts making claims about the safety of GMOs (Gaskell et al. 2001: 77).

The types of expectations involved in trust relationships vary according to context. Sztompka also discusses three analytically distinct types of expectations involved in 'bets' of trust: instrumental, axiological and fiduciary, each of which are progressively more demanding on the trustee. Instrumental trust involves expectations of regularity of conduct, reasonableness and efficiency. Axiological trust entails responses such as kindness or civility, truthfulness or authentic behaviour and fair or just treatment. Fiduciary trust is still more demanding, as it entails disinterestedness, representative actions (actions on the behalf of others) and generosity. In a sense this classification describes something that is increasingly demanding on the trustee. However, it is important to realise that "(e)xpectations involved in trust are congruent or incongruent with the nature of objects toward which trust is directed. Specific expectations fit to specific objects, and do not fit to others." (Sztompka 1999: 55). In the present theoretical context I take this to mean that the expectations involved in various formations of trust follow the functional differentiation of society. This means that a general formula of trust takes the form of 'A trusts B to do X' (Sztompka 1999: 55). Different expectations are directed towards family-members, bank advisors and scientists, that is they are role-specific and institution-specific. This, as I see it, is an important reason why cognitive investigations of trust-building mechanisms cannot provide adequate explanations of why some experts are trusted whilst others are not, without endowing the investigation with a historical and socio-structural index.[72]

In relation to technological controversies trust is primarily discussed as 'public trust', the trust of a (mostly unspecified) public towards the organisations innovating and regulating

[72] Being a scientist and applying 'scientific methods' does not in itself command trust in contemporary society because scientists and scientific organisations have in some instances proven unreliable or incompetent.

new technologies (and rarely their trust in 'the public' although this perspective can be said to be relevant in some of my cases). Here trust is usually equated with 'acceptance'. However, the (somewhat elaborate) conceptual considerations undertaken here – which aim at locating trust not in individual minds, but in social organisation – explicate at least two points of interest to the current investigation.

Although trust is usually give a positive valorisation (trust is preferable to distrust) one should be careful in assuming that trust is always desirable, partly because there are clear instances where knowledge (control) is preferable for all. However, the asymmetries involved in relationships of trust also mean that where trustfulness is practically always preferable for the trustee, it is only preferable for the trusting party if the trust granted is 'justified'. So public trust is preferable for a regulatory agency independently of whether or not it really controls the issues at hand (it avoids complexities), whereas this is not the case for the public. A further asymmetry between trust and distrust is that trust is usually not communicated unless a reciprocal relationship is sought. Trust can, so to speak, operate without being articulated. This is not so for distrust, which is usually only effective when articulated. Therefore, the problem of public trust is usually only communicated about when trust is absent – although of course a number of organisations have reflexively become aware that trustworthiness must be established prospectively rather than retrospectively. In the case studies these considerations will be used to explore in more detail how relationships of trust are configured differently in the different contexts the cases span. Here I shall attempt to pursue a little further in theoretical terms how the other element in public trust can be understood within the systems theoretical paradigm, namely that of 'the public'.

The Public as a Communication System

The purpose of this investigation is to explore how different pleas for more 'public involvement' in the management of technological risks have resulted in the devising of specialised, 'deliberative' procedures, how such procedures are shaped, and what effects they have. It is therefore necessary to reflect a little on how a concept of 'the public' can be understood within the theoretical framework suggested in this chapter.[73] However, it should be kept in mind that one assumption underpinning the investigation is that 'the public' is not a well-defined sociological entity, but a phenomenon that is actively constructed. Therefore, what is sought here is not an exhaustive definition of 'the public' on the basis of

[73] The word 'public' has several meanings depending on what is considered its 'opposite'. Three of the most important are: Public as opposed to secretive. This means that something is transparent and open to scrutiny by all. Secondly, public can be opposed to private, meaning something which is of collective concern. It is in this meaning that the Habermasian concept of a reasoning public is conceived. Thirdly, public can be understood as 'Publikum', as the object of the decrees of authorities or the audience of mass-mediated messages. All three meanings (and possibly more) tend to intermingle in the debates on public involvement, which can then take on multiple meanings.

the theoretical considerations, but some reflections on how 'the public' and its various operationalisations can be approached as an object of research.

On the conceptual level social scientific research is confronted with the fact that although 'the public' if often referred to in a number of contexts, there is no unanimous understanding of what it actually is. As argued by Neidhardt:

> *"In modern democracies the public plays an important role – but nobody seems to know exactly what the public is. Although this phenomenon has been frequently and emphatically reflected on since the beginning of the Enlightenment, it has not ceased to be a rather mysterious phenomenon. Within the rhetorics of modernity the public and, even more so, its apparent output, namely 'public opinion', function mainly as a fiction – a fiction which refers to some kind of volonté général, reminding us of the elementary semantics of democracy; and that means that this is a fiction which is not only puzzling, but also dignified."* (Neidhardt 1993: 339)

'The public' understood as the public sphere (Öffentlichkeit) does not play a central role in Luhmann's theorising. In particular, Luhmann does not endow it with the normative function it is given by Habermas, for whom the public sphere is a communicative structure linking a non-systemic lifeworld to the organisations and functional subsystems, and as such is given the task of articulating a collective will that should condition the operations of the latter. This is the understanding usually implied in the discourses on public involvement with technology. However, I will argue that systems theoretical considerations may be useful when approaching processes by which a public is actively constituted. It is possible to ask by what distinctions 'the public' is observed by organisations that observe the public as part of their (relevant) environment.

In systems theory the concept of the public is closely related to the workings of the mass media as a functional subsystem of modern societies. The role of the mass media is formulated rather abstractly by Luhmann. It 'directs the self-observation of the societal system' (Luhmann 1996b: 173). However, instead of seeing the mass media as the institutional and organisational locus of the process of forming a (consensual) collective will, Luhmann suggests that the mass media serves to produce communicative 'irritations' that synchronise the attention of the various societal systems (as well as that of individuals). As Luhmann argues at the beginning of his book on the mass media system, practically everything we know about society and the world, we know from the mass media (ibid: 9). The mass media produce knowledge that is available to everyone who wants it, and, which is neither specifically cognitive (i.e. directed at the kind of learning going on in the scientific system), nor normative (i.e. directed at the maintenance of norms ensured by the legal system) (ibid: 175). One could say that the mass media serves a memory function for society by selecting what is 'memorable' (information, news that deserves to be communicated and perhaps re-actualised) and what can be forgotten (non-information, old news). All complex systems have specific memory functions, but the mass media serves to maintain a certain level of shared references across different societal domains. As such, the mass media have specific

selection criteria (news/not-news), which are not necessarily congruent with the operational modes of other systems but which they are often forced to react to.

However, 'the public' (German: Öffentlichkeit) is not equated with the communication of the mass media system. It is instead defined as the society-internal environment of social systems.[74] In this formulation 'the public' acquires the status of a system internal construct (rather than a social entity). Systems see themselves as being observed by 'someone' in their environment, reflects this (makes it a theme of internal communication) and in some instances modifies its own operations according to what it believes will reduce complexity in relation to this environment (without, of course, abandoning the distinction between the system and its environment). In this understanding, 'the public' is not a social entity, that is something which can be observed as such, nor is it a functional system, or even an organisation. In principle it is 'free-floating' communication that resonates across various societal contexts and is observed in different ways from within the various systems making up society. This resonance is usually carried (and often amplified) by the mass media and is available to everyone, but can also be more specialised in its 'issue-' or 'sub-publics' (e.g. 'the scientific community', 'the NGO community' or 'the business world'). Of course some systems are more sensitive to the themes resonating in 'the public' and communicated in the mass media. From the political system it is observed as 'public opinion', something the political system must by nature be sensitive to, probe into and often 'respond' to. "*Obwohl, ja weil die Öffentlichkeit politisch nicht entscheiden kann, sondern gewissermaßen außerhalb der Grenzen des Systems der Politik liegt, wird sie in der Politik politisch benutzt und ins System hineinkopiert.*" (Luhmann 1996b: 187-88). Other societal systems are less sensitive in their operations to the themes resonating in the public, for instance science or the legal system, although organisations, operating on the basis of their codes, may observe themes from the public and let their decisions be influenced by them to varying degrees. Scientific communication is extremely unlikely to change on the code (true or false) or programmatic (theories used to formulate hypotheses and interpret data) levels as a result of public opposition articulated in the mass media. However, research organisations may choose to abandon certain research areas and take up others that are more likely to win public approval, or be pressured to investigate certain topics more thoroughly than they otherwise would.

Being the object of public attention will typically have consequences for the operations of a system.

> *"Wenn das System ... reflektiert, daß es von außen beobachtet wird, ohne daß schon feststünde, wie und durch wen, begrifft es sich selbst als beobachtbar im Medium der Öffentlichkeit. Das kann, muß aber nicht, zur Orientierung an generalisierbaren (öffentlich vertretbaren) Gesichtspunkten füh-*

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[74] "*... als gesellschaftsinterne Umwelt der gesellschaftlichen Teilsysteme, also aller Interaktionen und Organisationen, aber auch der gesellschaftlichen Funktionssystem und der sozialen Bewegungen*" (Luhmann 1996b:184-5).

ren. Funktional äquivalente Strategien sind solche der Geheimhaltung oder solche der Heuchelei. (Luhmann 1996b: 185)

When systems of whatever kind are confronted with the attention of the public, they will typically be constrained to respond in one way or another in order to limit the resonance that may be created as a result, and which may make the environment even more complex to operate in. As such, a system can attempt to reduce the complexity of its environment by communicating that what it is doing is in the 'public interest' (perhaps by attempting to 're-frame' an issue), it can attempt to make its activities invisible to the environment or it can become hypocritical, i.e. communicate that it is doing something other than it in fact is.

In this approach 'the public' or 'public opinion' is understood as something observed from within systems as being located in the environment but with relevance for the operations of the system. This 'something' is neither an interaction system (which would require co-presence), an organisation (which would require membership regulation and 'decision-making', but membership is not regulated and the public does not make decisions) or a functional system ('the public' does not operate according to a well-defined code, it can only reflect the workings and effects of the codes of other systems). This approach is compatible with the more conventional understanding of the public as a mixture of actor- and audience-elements (Bora 1999: 72), where actor-roles are characterised by possessing a 'voice-option' and audience only an 'exit-option' in Hirshman's classical terms. Most of the time individuals and organisations form part of the audience (or are not paying any attention) and sometimes they participate actively in contributing to public communication. According to systems theory the chances of achieving resonance for one's contributions vary significantly in different systemic contexts, although it does not spell out exactly how. It is unspecific about which factors are decisive for whether public communication is likely to be observed as relevant within the modes of observation in particular contexts. This is the object of more specialised theorising and empirical knowledge.

If the public does not equate with the mass media system neither is it exhausted in the phenomenon of protest or social movements. Protest actors (organisations or movements) are clearly important contributors to communication in 'the public sphere' or the mass media, which some organisations see as their relevant 'public' environment. Protest movements and the mass media system clearly operate in a symbiotic fashion, as movements often deliver the kind of communication that have significant news-value according to the selection criteria of mass media organisations (surprises, visually spectacular events, conflicts, scandals, moralisation etc.) and are often dependent on doing so in order to survive in the media market (Eder 1996a). Social movements, however, *are* not 'the public', they address the public in the hope and expectation that their framing of events will 'resonate' or create additional communication, perhaps across different societal sectors, and exert

pressure on those 'responsible'.[75] Against this conceptual background, how may we then interpret the call for increased involvement of 'the public' and the procedures seeking to operationalise such involvement?

Public Participation Postulates Revisited

In approaching this question I shall draw inspiration from Alfons Bora (1999), who has undertaken a thorough, Luhmann-inspired discussion of the functions and effects of the increased influence of participatory semantics in relation to technology.

With the transformation to a functionally differentiated society, where the production and distribution of practically all social products are maintained via functional systems (and their central organisations), questions concerning the *inclusion* and *exclusion* of individuals from these systems become central. Who belongs in which systems (and how) must be decided. The overall trend is one of all-inclusion, in empirical as well as normative observations. In principle, no one should be excluded from enjoying the benefits of the central functional systems of modern societies. Historically, this is expressed by gradually increasing inclusion in practically all domains: expansion of the franchise, increased access to education, equality before the law, freedom for research, freedom to trade, freedom to publicise and so forth. As argued in short by Bora: "*Inklusion ist in dieser Hinsicht für modern Gesellschaften der normative Standard, Exklusion ist dagegen regelmäßig gesondert legitimationsbedürftig*" (Bora 1999: 11). At the same time the systems developed sophisticated internal structures defining and distributing roles for the inclusion of individuals. That everyone becomes subject to the rule of law does not mean that everyone gets to be a judge or a lawyer, just as the franchise for all does not mean that everyone gets to participate in all political decisions. Nor do freedom to do scientific research entitle everyone to have research funded or published. There are important intra-systemical and -organisational procedures that regulate more specific issues of inclusion and exclusion. However, Bora also notes a more expansive understanding of social inclusion understood as *active participation*, which runs under labels such as 'public', 'citizens' or 'affected' particpation (ibid: 11). This entails a movement of individuals (and in some instances organisations) from an audience to an actor role. Bora ascribes these demands for increased involvement in a wide spectrum of contexts primarily to the increasing complexity of modern societies:

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[75] If we take as an example the much debated 'Brent Spar affair', where Shell was forced to change its plans about dumping an oilrig at high sea, Greenpeace may be the initiator of the debacle, but Greenpeace cannot be said to be 'the public' (or represent the public for that matter). However, Greenpeace brought the plans of Shell to the attention of the public in a manner that resonated forcefully. The 'place' in which this resonance is expressed is of course primarily mass mediated communication, but the mass media 'is' not the public either. Resonance is only achieved because the mass media outlets manage to attract and maintain the interest of an audience. And it is with reference to this resonating audience that Greenpeace could 'pressure' Shell into changing its plans – Shell began to see itself as observed by its environment in a way that inhibited its mode of operation (profit making in the long run).

"Als Ursachen für diesen Trend zu mehr oder erweiterter Partizipation werden vor allem die steigende Komplexität moderner Gesellschaften, die Steuerungsprobleme nach sich zieht und deswegen kooperative Formen politischen Handelns nahe legt, sowie schwindende Akzeptanz staatlichen Handelns ausgemacht". (ibid: 12, footnote omitted)

In what Bora calls consensual theories of social integration, among which he counts theories of deliberative democracy, in particular in its Habermasian version, increased participation (the inclusion of individuals) is more or less equated with increased social integration.[76] In Habermas

... hängt gesellschaftliche Integration letztlich von lebensweltlicher Selbstbehauptung ab, also davon, ob es gelingt, soviel lebensweltliche Rationalität (Sittlichkeit) gegenüber medienvermittelten Systemimperative, Tendenzen der Verrechtlichung und damit schließlich der Kolonisierung der Lebenswelt zu behaupten, daß der Zugang zu den lebensweltlichen Strukturen für die Gesellschaftsmitglieder selbst nicht verschüttet wird. (Bora 1999: 45)

Therefore

"... müsse der Expertendiskurs mit der demokratischen Meinungs- und Willensbildung rückgekoppelt werden, wenn man nicht Gefahr laufen wolle, die Problemwahrnehmungen der Experten gegen die Bürger in Form eines „legitimationsgefährdenden Systempaternalismus" einfach nur durchzusetzen." (ibid: 51)

Although not all participation semantics refer to the sophisticated theoretical reasoning found in Habermas, Bora believes that Habermas' writings represent a fairly adequate reconstruction (and legitimation) of the demands for increased public involvement in a number of societal domains. Bora adds, however, that in a number of domains where various types of public involvement and participation have actually been organized, this has not necessarily led to the kind of absorption of protest and strengthened legitimacy of governance envisioned by the protagonists of such procedures. Discontentment with procedures often continues or is aggravated in such instances, and 'immunising' effects in the systems and organisations confronted with public demands for involvement can sometimes be observed, as they see themselves confronted with what they consider an inappropriate politicisation of their operations. In the deliberative democracy framework these immunizing effects can only be observed as pathologies arising either from an inadequate or insufficient (unfair) implementation of deliberative procedures, or as a (alienating) lack of responsive-

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[76] *"Als geradezu klassisch kann in der Soziologie die Vorstellung gelten, nach der soziale Integration einen wie immer näher zu definierenden Zustand der Einheit darstellt, in welchem die Teile des gesellschaftlichen Ganzen zusammengefaßt sind. Wenn und soweit Gesellschaften integriert sind, heißt das, nehmen ihre Element an der Einheit des Ganzen teil, ja sie bilden sie durch ihre Verbindung überhaupt erst. Einheit entsteht also nur über eine Beteiligung dessen, was in der betreffenden Theorie als Element der Gesellschaft behandelt wird. Im Hinblick auf Individuen bedeutet das dann: gesellschaftliche Integration wird über die Einbindung von Personen in soziale Prozesse, mit anderen Worten über ihre Teilnahme (Mitsprachemöglichkeit) bzw. Teilhabe an Kommunikationen (Möglichkeit, über die Regeln der Teilnahme mit zu entscheiden) erzeugt; Partizipation stellt dann eine notwendige Voraussetzung gesellschaftlicher Integration dar. Umgekehrt läßt sich daraus der Schluß ableiten, Differenz allgemein und soziale Differenzierung im besonderen seien per definitionem mit Desintegration gleichzusetzen."* (Bora 1999: 38-39).

ness of the functional systems and organisations to the expectations and requirements of the life-world as explicated through collective deliberation.

As an alternative to this Bora suggests, with reference to Luhmann, that we may see the inclusion of individuals in society and social integration as two separate phenomena which need not necessarily be related.[77] In this approach, *inclusion* designates a mode of observation of individuals within social systems, whereas social *integration* has to do with the structural couplings between the various subsystems of society. In systems theoretical terms *inclusion* has to do with how psychic and social systems interpenetrate and *integration* with the production and maintenance of structural couplings that enable social systems, that constitute one another's environment, to place performances at each other's disposal in productive ways.[78] As these are two distinct phenomena, says Bora, it cannot be expected as a matter of principle that an increased observation of the form 'person' in social systems necessarily leads to an increased ability for social systems to create (productive) resonance amongst themselves.

Inclusion – as the observation of persons in social systems – can mean a number of things. As mentioned above, in principle all persons are included in the major functional systems of modern society. However, they are so in differentiated ways, which are largely regulated through membership in organisations. This theoretical approach conceives of 'public participation' as a particular mode of inclusion (Inklusionsmodus) (ibid: Chapter 2.2). If one understands the concept of the public (Öffentlichkeit) as a mixture of actor and audience elements, the 'default inclusion' of most individuals in functional systems is as the 'audience' in one form or another (subjects to the rule of law, voters, lay people observing scientists, non-owners of most property etc.). In this perspective the semantics of participation thus entails claims that (certain) individuals and organisations should be 'moved' from an audience to an actor role, be equipped with 'voice-options' rather than just 'exit-options'. Of course 'the public' cannot be included in organisational contexts as a macro-actor. Therefore, it is necessary for the organisations that are interested in inputs from 'the public' to find ways through which contributions from various issue-publics can be communicated and thereby be made observable in the communication of functional subsystems and organizations. The non-localised resonance of public opinion is expected to be 'embodied' by specific individuals or organisations with whom dialogic interaction can be established, and

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[77] "*Inklusion ist nach diesem Verständnis ein spezifischer Modus der Beobachtung von Menschen in sozialen Systemen, der nicht in der Weise unmittelbare mit gesellschaftlicher Integration in Zusammenhang gebracht werden kann, wie die Konsenstheorie vorschlägt.*" (Bora 1999: 58).

[78] Inklusion, *das kann als allgemeine Funktionsbestimmung nun festgehalten werden,* bezeichnet eine spezifische Form der Beobachtung von Menschen in Kommunikationssystemen, *nämlich die Art und Weise, in der Menschen in Kommunikationszusammenhängen als "Personen" behandelt werden. Inklusion ..., bedeutet dann, daß ein autopoietisches psychisches System, das auf der Basis von Bewußtsein operiert, seine Eigenkomplexität zum Aufbau sozialer System zur Verfügung stellt.*" (Bora 1999: 64).

to that end specialised communicative and organisational contexts are (arguably increasingly) evolving.

In Bora's conceptualisation there is an intimate relationship between the calls for increased involvement of the public and the emergence of risk issues in modern societies (ibid: 77). As discussed above the risk thematic in the systems theoretical approach is observed through the distinctions between risk and danger, which in the social dimension is tied to the distinction between decision-makers and those affected by decisions. The inclusion of a wider circle of people in decision-making forums thus in a sense serves to reconfigure the decision-maker/affected distinction with the purpose to *absorb protest*, if not to do away with it.[79]

As argued above, the uncertainties entailed in decision-making can to some extent be offloaded between the different functional systems through structural couplings. However, when this does not work in ways that convince 'the public' (which sees itself as exposed to dangers), protest is likely to emerge. And many an organisation (in politics, science or the economy) has experienced that such protest can at times resonate quite significantly in the public sphere, often leading to demands of 'responsible behavior' among those in charge. Those protesting are rarely willing or able to take over responsibility completely (this role is reserved for the opposition within the political system) – however, at times it seems promising to consult them, exactly to absorb some of the protest potential. This can be seen as an important functional (rather than normative) reason behind the increased interest in public involvement (cf. Chapter II) and the differentiation of intermediating organisations, such as (P)TA institutions.[80]

Challenges to Public Involvement Procedures

Using the theoretical concepts unfolded above, I will now suggest a systems theoretical reconstruction of the social location of public involvement procedures. I shall also draw on the theoretical reflections to suggest certain challenges such procedures are likely be faced with when observed from this perspective. It must be kept in mind that these are theoreti-

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[79] "Mit der Einebnung von Entscheider-Betroffenen-Differenzen fällt der Öffentlichkeitsbeteiligung also ganz offensichtlich die Funktion zu, *Protest zu absorbieren.*" (Bora 1999: 81).

[80] Bora has the following to say about the *legal system's* increased involvement of the public in administrative decisions regarding the licensing of controversial technologies: "*Wo Systeme über Leistungsbeziehungen nur lose gekoppelt sind, soll dann womöglich Inklusionsvertiefung as funktionales Äquivalent eintreten. Zurechnungsprobleme bei Risikoentscheidungen lassen es verlockend erscheinen, sich angesichts des Versagens von Politik und Wissenschaft wenigstens die Zustimmung der potentiell Betroffenen zu sichern, also etwa im Falle von raumzeitlich schwer eingrenzbaren Folgen neuer Technologien jedermann die Teilnahme am konkreten Normbildungs- und Entscheidungsprozeß zu gestatten, um mögliche Gefahren zu identifizieren, das Verfahren zu kontrollieren und genehmigungsrelevante Sachverhalte zu präzisieren. Dies ändert nicht die Unsicherheit der Entscheidung, soll aber im Idealfall den Ausfall von Politik und Wissenschaft kompensieren, die das Recht mit der Entscheidung über die Genehmigung neuer Technik allein gelassen haben, ohne zuvor gesellschaftlichen Konsens über die wesentliche Tatbestände sicherzustellen.*" (Bora 1999: 84)

cal projections, mere tools for the empirical investigations of the subsequent chapters. They serve to guide my empirical attention, not to foreclose the results.

The kind of technological controversies that have a locus in public concerns, declining trust in technologists and regulators and a potential for mobilisation are primarily observed in the political system as the communication of *protest* from more or less well-organised actors on the periphery of the political system.[81] Concerns or discontent among members of the citizenry that are not articulated (nor induce resonance) in the public sphere are unlikely to have any impact.[82] Of course, concerns or discontentment are also observed by organisations operating primarily in other functional systems, for example a research organisation experiencing concerns over research methods (animal experiments, research on human foetuses) or economic organisations experiencing targeted boycotts or unorganised declining sales (e.g. food scares pertaining to certain products). However, independently of where such 'problems' are observed, they are usually (also) addressed to the political system with demands that 'action' must be taken. As suggested by Cultural Theory this location on the periphery of the political system is likely to mean that the concerns selected for attention are not those that are central to decision makers. This may lead to collisions of different problem framings in different arenas.

As systems theory assumes that the functional systems of modern societies are autopoietic, it claims that the political systems cannot 'steer' the operations of other functional systems in any detail. They can only condition certain contextual features under which they are operating – what Willke has discussed under the heading of decentralised context-steering (dezentrale Kontextsteuerung) (Willke 1987, 1996). For instance, the political system cannot produce scientific knowledge or technological innovation, but it can seek to condition scientific knowledge production to develop in certain directions rather than others through the channelling of financial incentives and legal regulation.

Of course a multitude of configurations of such strategies for conditioning the operations of the functional systems and their organisations are possible. However, for the sake of analytical parsimony I suggest here that we may distinguish between two overall strategies, which I will describe as aiming at either a strict or loose structural coupling between the functional domains.

By *strict* structural couplings between subsystemic rationalities I mean situations where the functional systems condition each others' operations in well-defined and unambiguous manners. In the area of risk regulation this will mean for instance that the political systems

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[81] By periphery I mean that they contribute to political communication, and seek to influence decision-making, but they rarely contend for political positions or conceive of themselves as part of the political establishment.

[82] The can be considered 'marginal' in the cultural theoretical sense.

unambiguously defines the levels of required protection, which are then (at least in principle) legitimised as collectively binding and ideally ensure the public acceptance of technologies. The political system then delegates to the scientific system the competence to define the cognitive equivalent of this level of protection, typically in terms of limit values (with a certain margin, which is usually also left to the scientists to decide). These limit values are then applied by the legal system to grant licenses and to monitor whether punishable violations are taking place. If violations of limit values are observed, these are sanctioned (typically fined), and economic actors see it as in their interests to stay within the boundaries set by the legal frameworks. This is obviously an iterative process. If at some later point it is discovered that the limit values do not provide the politically required level of protection, they are modified through more research. If it turns out that market actors realise that it is profitable to violate them, the fines are modified accordingly. This description is of course grossly oversimplified compared to real life processes. However, the point is that when public concerns and protest is observed, a regime based on strict structural couplings will respond by attempting to minimise the scope for ambiguity in its intersystemic relations. This is for instance seen in the insistence that risk regulation should be founded on 'sound science' or be 'evidence based' – and the management of uncertainty and knowledge deficits is delegated to science, which is equipped with a cognitive monopoly. The influence of other considerations and the idiosyncrasies of individual research organisations or regulatory organisations are minimised, which means that the domain over which science-based organisations can preside is curtailed, yet scientific organisations are accorded autonomy within it. Similarly, strict interpretations of and adherence to legal programming will be observed by administrative organisations in order to avoid subsequent criticism.[83]

Opting for strict structural couplings typically means that processes such as risk regulation will be characterised by a high degree of organisational specialisation. As a consequence, their functions will be carried out by self-referential 'epistemic communities' or technocratic organisations, which are often seen as intransparent to the public and considered difficult to hold accountable to political agencies. Therefore, 'independency' and 'transparency' become keywords when organisations are put under pressure. However, at least in certain cases, such organisations are unable absorb protest and command public trust, in particular when problem definitions are not shared with those inclined to protest and issues begin to resonate in the public sphere.

In such situations strict structural couplings – often hierarchically ordered – are increasingly seen as inadequate for the governance of modern societies. The autonomy of the functional system means that in growing complexity, they not only condition one another's op-

[83] Such tendencies are reported for instance in the administration of the first German law on genetic engineering, which demonstrated severe difficulties in legally codifying 'good scientific practice'. In following all the rules laid down, the experiments that the law was meant to regulate (but also enable through permission) became virtually impossible to carry out (Hasse and Gill 1994).

erations but produce externalities, which they 'load off' on each other. Politics cannot produce sufficient legitimacy, nor science sufficient cognitive certainty, nor the legal system sufficient acceptance of its rulings, nor the economic system acceptable distribution of goods. These inadequacies are subsequently shifted around between the different systemic and organisational contexts.

A different strategy is to loosen the coupling between the functional domains, to allow more ambiguity in the interactions between the different systems. This may stimulate systems to be self-governing, and through the observations of feed-back mechanisms to build up an understanding of the effects of their own operations in their environment (Willke 1996).[84] This leads to a differentiation of arenas of mutual observation and interaction between organisations otherwise operating primarily within one functional domain. To strengthen learning processes in such arenas and the public legitimacy of their outputs, inclusion of 'the public' is often seen as desirable.

The kind of 'organised' public involvement investigated in this thesis can be seen as deliberate attempts to create arenas where different viewpoints, perceptions, and biases can 'meet' each other. Here they may, potentially, be mediated in more holistic assessments of technologies – taking into consideration several systemic perspectives, than would otherwise be the case – and thus absorb some of the potential for public dissatisfaction. In doing so, the participatory rhetoric discussed earlier clearly serves legitimatory and inspirational functions, as the search for legitimacy is pursued by the inclusion of persons or organisations that would not 'normally' be required for the maintenance of the functions of the organisations in charge of, say, risk management. However, from a systems analytical mode of observation, it is also possible to identify certain challenges to such procedures, which can be seen as clues as to where empirical attention should be directed.

One basic premise of autopoietic systems theory is that on the level of the functional systems there can be no 'mediation' or code-syntheses. The codes of the functional systems are binary and cannot change their 'other side', nor can they have more than two values. Communication within the functional system must proceed on the basis of these codes. Of course a definition from a sociological theory does not determine reality, but it seems difficult to envision 'alternative' codes in reality (see e.g van den Daele 1987 for a discussion on 'alternative' science). When communication operates within a certain functional system, it has to proceed on the basis of the appropriate code. The scientific system cannot determine scientifically whether a communicated truth claim is profitable, only whether it is true or false. Of course scientists can discuss e.g. whether a given research programme seems feasible in financial terms. However, once the code changes, the system reference has

[84] The shift from strict to loose couplings can of course as well be something forced upon (certain) organisations as the product of a deliberate strategic choice.

changed and the communication has 'left the system'. Once scientists stop operating on the basis of the true/false code and start debating whether a given experiment is financially feasible, communication has changed to the economic system. This kind of change of system reference is of course unproblematic for interaction systems and organisations, they are able to operate in multiple contexts.[85] However, from the vantage point of systems theory it seems likely that attempts to change the system reference will be met with immunising reactions so that systems can maintain their autopoiesis (Bora 1999). Attempts at code substitutions are not only perceived to be dysfunctional at the systemic level, they are also often considered morally objectionable and sanctioned (e.g. attempts to buy legal decision or dictate 'truths' using political power). At the level of the functional systems, there can hence be no mediation. It is not unlikely that procedures of public involvement will be perceived by the organisations 'normally' in charge of a given task as processes of 'politicisation', as attempts to continue communication on the basis of a 'power' code ("we demand") rather than the expected legal or scientific code. The change of code is perceived as 'unfit' for the purpose that is the primary objective of the organisation.

If there is to be 'mediation', it must therefore be located at the organizational level. What does this mean in systems theoretical terms? First of all, it is unlikely to mean that otherwise distinct organisations will merge. Procedures of consultation will not result in environmental or protest movements being integrated into risk assessing regulatory bodies (or the other way around). At the most it can mean that organisations 'interpenetrate', namely that they perform certain tasks that mutually condition their operations. Representatives of environmental organisations can participate in the work of regulatory bodies providing, say, special kinds of knowledge and extending public legitimacy to the institutions in return for being able to communicate to her constituency that 'influence' has been achieved. At this level, the Cultural Theoretical approach is instructive in pointing out some of the incommensurabilities that are likely to emerge when organisations with different cultures and from different sectors of society confront each others' framings and observations of 'the same' topics, which may turn out in fact to be very different. Here it seems likely that what can be termed collisions of discourse-formations (Bora 1999) are likely to occur. Collisions of discursive formations happen when diverging framings of the issues to be examined are confronted with each other and turn out to be incommensurable. In such situations it is likely that arguments and framings will be used strategically with the aim of gaining communicative advantages (in front of an audience that can be mobilised or brought to resonate in other contexts) rather than the establishment of co-operative modes of interaction.

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[85] With the changes in the biotechnology sector indicating an increasing interaction between research/innovation and the creation of spin-off companies, and the profitability of research, such interactions on the *organisational* level must be expected to increase. This, however, does not mean that the scientific and economic systems merge as such.

It is, however, probably no coincidence that such procedures often aim to proceed on the basis of interaction between individuals that are co-present. The co-presence of individuals is likely to heighten the capacity to process complex issues to the extent the individuals are able and willing to take on different perspectives (van den Daele 2001), or in Habermasian terms to 'virtualise' their own criteria of validity. Organisations operating in the medium of decisions cannot as such take over the 'perspective' of another organisation without losing their identity and ability to continue as (the same) organisation. Individuals, on the other hand, are able to observe an issue from many viewpoints without giving up their identity. Therefore, individuals are able to put an enhanced observational capacity at the disposal of the organisation or organisations of which they are members. In principle at least, this should enhance the potential for an increased observational capacity in the dynamic between organisations, although it is by no means certain this will happen. Even without organisational commitments in interaction, the communication of disagreement is as possible as agreement in interaction systems.[86]

It therefore seems reasonable to expect that much of the potential of such procedures to solve the kinds of problems they are conceived to solve, depends on the ability to create framings where, if problem definitions are not shared, then at least the participating individuals and organisations perceive co-operative solutions as preferable to the continued communication of disagreement. And while it seems possible to theoretically describe conditions that will make this more likely, I believe that the conditions encouraging or discouraging such cooperative processes are context-sensitive, and it is thus difficult to specify them with sufficient relevance in this context.

Instead I shall briefly return to the organisational level. Here a systems theoretical mode of observation foresees difficulties in establishing the kind of communicative procedures the participatory and deliberative ideas envision due to immunising tendencies from organisations rooted primarily in specific functional systems. These are likely to find the necessity to operate with foreign codes troubling, and the incommensurability of different organisational cultures can lead to mutual misunderstandings. Furthermore, as the formation of such procedures presupposes a more loose and ambiguous configuration of the structural couplings between the functional systems, that is when the tasks they can delegate to each other are not highly specified, it raises the question of how the 'products', the communicative outputs, of such procedures may *resonate* with organisational contexts in their environment is raised. Formulated in systems theoretical terms this requires that the outputs are in some way or another made relevant for the organisations that are envisioned to be influenced by such procedures, that there is some kind of connectivity (Anschlußfähigkeit) between the procedures and their environment. Procedures can of course be configured in

[86] This, in turn, again raises the question of how organisations are structured internally and what mandate they can equip representatives with.

various ways, but to the extent that they are flagged as 'public involvement' the frame of reference will typically be the political system (or in some cases the legal system in cases of specific administrative decision making) rather than the scientific or the economic system. Ideas such as 'Mode 2 knowledge production', 'socially robust knowledge' and the like aim at describing how public involvement in science can be envisioned and ideas such as 'political consumption' and the accompanying debates on labelling regimes aim at channelling public participation through market activities. Nonetheless, I will argue that these interactions are mostly dependent on at least some political attention to achieve notable effects. As such, it seems that the couplings to political communication and policy formation of such procedures are an important area of investigation.

Re-visiting the Research Question

In this chapter I have introduced some of the basic elements in autopoietic systems theory and attempted to explicate how this particular theoretical paradigm can contribute to the explorations of the topics investigated in the thesis. The discussions have focused on analysing the background of contemporary controversies over technology as grounded in a functionally differentiated society, where, it seems, the different functional domains are likely to create externalities for each other, which allows uncertainties and decision problems to 'travel around' between different systemic and organisational contexts – a tendency which seem to be amplified when public attention and resonance is added. This happens in ways that, on the one hand, make it difficult to handle the cognitive, normative and social complexities attached to technological innovation, and on the other, the active maintenance of the trust and willingness of the public to absorb uncertainties is made still more difficult. In this approach risk is not understood as related (solely) to physical hazards, but more generally as a mode of observation based on the distinction between decision makers and those affected by decisions. Likewise, trust is not understood as a characteristic located in individual minds but as a generalized willingness to let others make decisions on one's behalf.

Again from the vantage point of systems theory I have tried to outline a way to approach 'the public' which is sufficiently general in descriptive and normative terms to cover a host of different phenomena observable in the social management of risk and uncertainty, but conceptually specific enough to render the operations and dynamics of 'the public' and public involvement accessible to empirical investigation. In the following the task will not be to 'test' these rather abstract assumptions of systems theory, but to apply the conceptual tools in order to describe and analyse specific instances of processes where 'the public' is transposed from a general mode of communication to specific, concrete procedures. For that purpose it seems pertinent to re-visit the research question and briefly explicate how its wording can be interpreted in light of the theoretical reflections before proceeding with the empirical operationalisation.

The research question was formulated as:

How are public involvement events organised to impact on the discursive dynamic in the GM biotechnology policy arenas?

More specifically, how do conceptions of 'the public', their concerns and their role in policy-making mediate the effects of public controversy on policy formation in this area?

In short, the question is how the public is 'operationalised' in the kind of procedures where public involvement is wanted – and what effects this may have. The theoretical reflections so far have indicated that the public should not be understood in an essential sense as a sociological entity, but rather as a specific mode of communication, which can resonate across different functional domains and organisations. However, in practical instances the involvement of the general public's perspectives and concerns is often based on the inclusion of either individuals or organisations, which are in some ways perceived to represent or articulate this public. The 'discursive dynamic' in such procedures will be analysed as *conditioned* by functional differentiation and 'policy arenas' will be understood as the specific *communicative contexts* where policy decisions are prepared and made and which serve as shared communicative foci for the involved individuals and organisations. Furthermore, the conceptual considerations on risk and trust indicated that a distinction between decision-makers and those affected by decisions – however configured – is likely to induce the dynamic of technological controversies observed. Therefore, how the distinctions between decisions-makers and 'affected' are constituted in specific instances should be explored. In this context trust can be understood as the willingness (of individuals and organisations) to take over (or silently accept) the selections of others (decision-makers) and make them the basis of their further operations. Here 'the public' (as affected) becomes an important rhetorical figure, the formation and use of which shall be investigated more closely. The explanatory focus will be on accounting for similarities and differences in the differentiation of communicative contexts aimed at mitigating technological controversies, and how different 'formats' of public involvement impinge on the policies pursued. How these considerations can be specified more concretely for empirical research will be the topic of the following chapter.

Chapter IV

Operationalisation, Methodology, Case-selection

At this point the thesis shifts its focus from the relatively neat and tidy world of sociological theory and existing research literature, the topics of the previous chapters, to the more messy domain of real life empirical phenomena, where complexities and contingencies can be expected to be abundant. In order to make this transition in a conscious and directed manner some preliminary reflections are appropriate.[87] These reflections will pertain to three issues; the operationalisation of the theoretical considerations into empirical questions, the methodology informing the case studies and the selection of cases to be investigated.

Operationalisation

In the previous chapter the theoretical explorations regarding the background and dynamics of technological controversies primarily drew on Luhmann's autopoietic systems theory. This theory is in many respects highly abstract and general, and does not translate easily into operational research questions or hypotheses. Therefore, some reflections on how the abstract theoretical framework can guide concrete empirical research are required.

First, a few clarifications about what the theory does and does not provide in order to anticipate potential misunderstandings which are at times encountered with regard to the use of systems theory in empirical inquiries. In one way the theoretical work of Luhmann is extremely ambitious, in that it aims to produce a 'grand theory' that can be applied to all aspects of society. In another vein, however, one may also argue that the theory is rather modest, as it leaves a large scope to contingency in social life – and hence a considerable scope for empirical research into how communication and communicative structures actually develop in specific instances. The theory outlines some broad assumptions about fundamental features of modern societies, but it does not claim to be able to predict the course of specific events, nor that these are *determined* by the basic assumptions (they are, rather, *conditioned* by them). As such, the theory is not devised to produce hypotheses which may subsequently either 'confirm' or falsify the theoretical framework whether in part or in its entirety. The aim of the theory is to facilitate a specific mode of self-observation by modern societies, providing a consistent structure of concepts and distinctions through which sociology – as one particular subsystem of communication – can observe society and reflect on this observation. Arguably, one of the most fundamental ambitions of Luhmann is

[87] This chapter to some extent represents a retrospective 'tidying up' of the actual learning going on in the research process. It must therefore be read as representing a combination of the methodological reflections and choices made prior to the initiation of the empirical work and a subsequent effort to make this consistent with what was found as the work progressed.

to develop a theory that can deal with problems of self-reference, i.e. the fact that a theory that aims to encompass all of society will appear as an object to itself itself. A theory of society as the totality of all communication must also be a theory of the theory itself, as the theory is also a product of societal communication. Luhmann's ambition is hence to develop tools – concepts and distinctions – that can deal with these issues of self-implication, and this ambition fundamentally conditions the architecture of the theory.[88]

These self-implicating issues need not be developed in great depth here. The present task is more modest - to apply some of the tools developed for the observation of modern societies within this general theoretical enterprise to a specific issue, as I assume they may prove fruitful for the present topic and purpose. However, it should be noted that the concepts, assumptions and distinctions I take from Luhmann are not meant to serve as hypotheses to be tested. Rather, they provide tools with the help of which certain aspects of my cases can be observed – hopefully in a manner that proves informative. The 'test' of the applied concepts and assumptions is therefore only implicit, namely an assessment of whether worthwhile observations can be facilitated by them.[89]

Central among these assumptions is the image of modern society as functionally differentiated. This is taken to provide a description of the societal background against which the processes to be discussed took place – an a priori of the investigation if one likes – not a hypothesis to be tested. This a priori assumption arguably presents the investigation with two challenges when it comes to accounting for the dynamics of the actual cases to be investigated. The first has to do with how *agency* – the authorship of specific communications – can be understood and accounted for within this mode of observation. The second has to do with whether and how this approach can deal with some of the diagnostic claims discussed in Chapter II. The arguments presented earlier actually envision that some kind of *de-differentiation* is taking place between the domains that autopoietic systems theory assumes – more or less by definition – to be mutually exclusive, i.e. that the borders between science, politics, business and law (regulation) are eroding. I shall now address these two issues in turn.

Some observers have claimed that autopoietic systems theory exhibits an explanatory deficit regarding processes of societal differentiation. It is claimed that the *consequences* of differentiation are well worked out by systems theory, but the processes *leading to* differentiation cannot be explained without recourse to goal pursuing agents, who cannot be accounted

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[88] This stance on the construction of social theory entails an acceptance that in the final instance a sociological theory with global ambitions must inevitably be based on axiomatic assumptions that are beyond empirical verification or falsification. Arguably, one of the strengths of Luhmann's approach is that it makes a virtue of reflecting this necessity, rather than seeking to disguise it.

[89] I.e. whether they can in fact reduce the complexity of the observed reality in a way that will provide social scientific communication with some advantages as compared to other modes of observation. As I do not propose to observe the cases from the vantage point of competing theoretical frameworks, this comparison will of course remain implicit.

for in terms of autopoietic, functional subsystems alone (e.g. Schimank 1985, 1988). The point is important, but I am not convinced that systems theory cannot in fact deliver a satisfactory solution. However, this general discussion is too far-reaching to be pursued here (see e.g. Bora 1999: 150-58 for a more thorough discussion of the critique, and Schneider 2003 on the systems theoretical approach to action). Here I am not occupied with the long-term evolution of the functional subsystems and their mutual differentiation, but take patterns of functional differentiation as a relatively stabilised feature of the context in which my cases are located. Therefore, the description of functional differentiation is taken to serve two main purposes. Firstly, in order to understand important aspects of the background of the technological controversies observed, which, as I argued in Chapter III, could indeed be seen as rooted in problems of coordination between different modes of observations owing (in part) to functional differentiation.[90] Secondly, functional differentiation is seen to significantly condition attempts to establish communicative forums or procedures equipped with what must be perceived as poly-contextual competences of observation.

Systems theory does not explicitly deny the existence or importance of agency in the dynamics of modern societies (Schneider 2003). It only insists – due to its epistemology – that in the final analysis agency is a communicative product which only emerges as agency when 'acts' (as well as interests, goals, strategies etc.) are *ascribed* to agents in communicative processes. Furthermore, in this approach actors or agents – whether individuals or organisations – are not perceived as natural entities, they are 'products' as well as sources of communication. Actors as well as acts are important focus points for the communications that make up social systems, be they located at the level of functional subsystems, organisations or interactions. However, I do agree with Schimank in his assessment that functional subsystems cannot be claimed to 'act' as such (Schimank 1985, 1988). Rather, the types of communication they facilitate via their codes and programmes *condition* the 'acts' of organisations and individuals, who do have the capacity to formulate (communicate) goals and strategies. A consequence of this is that they are observed and communicated about as actors acting by themselves and by other systems in their environment.[91] Hence, whether or not the communicated intentions and goals are in fact achieved, and/or how they are modified over time, may also be observed. In the descriptive sections of the empirical inquiries such abbreviated (complexity-reduced) forms of observation of communication will be widely relied on to account for the actual communication taking place in the processes scrutinised. Some of the dynamics of the case will in fact be accounted for as intentional

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[90] But also in the fact that the institutional consequences of functional differentiation are not necessarily accepted as legitimate by (all sections) of 'the public'.

[91] Although systems theory arguably has a tendency to analyse goal setting and strategies of agents as products of the opportunities offered by the communicative context rather than as independent variables (Schneider 2003).

actions of individuals and organisations. The use of autopoietic systems theory is not intended to make the investigations so esoteric that observations of actors and agencies are omitted or assumed to be wholly determined by functional differentiation. The goal is to facilitate a certain mode of observation of how (primarily organisational) systems observe each other, and how such observations are conditioned by functional differentiation. In doing so there is no need to ignore agency, as long as it is kept in mind that the fundamental units of analysis are communicative events.

In the present study agency is primarily located at the level of *organisations* (but in some instances also with individuals who are observed as persons in communication). Unlike the functional subsystems, organisations are systems of communication that are able to set goals, devise strategies, and actively monitor the effects of their communications on their surroundings. As argued in Chapter III, organisations may – or may not – understand themselves to be primarily affiliated to a particular functional subsystem, but they cannot be oblivious to communication based in other subsystems or organisations pursuing different goals. As such, much of the descriptive tracing of the communicative dynamics in the cases will take the form of recounting communicative 'events', which are seen as contingent outcomes of the decision making resulting from mutual observation between organisations and collective actors, and the resulting communication in and outside various 'publics' or 'arenas' (understood as shared foci of communicative attention). This means that for most of the investigation, organisations will be considered as unitary actors, although they are in fact made up of multifarious communicative processes. In some instances information concerning the goals, motives and strategies of such organisational actors will be sought in the communications not only of the organisations themselves (e.g. analysis of documents), but also in those of individuals speaking on behalf of the organisations.

The second issue to be addressed in the operationalisation is how a theoretical framework which more or less a priori claims that modern societies must be considered as functionally differentiated, relates to claims that de-differentiation is taking place, for instance in the production and validation of the knowledge guiding technological dynamics (see Chapter II). This is particularly pertinent as the thesis aims to investigate procedures whose raison d'être is to process issues in what can be termed a poly-perspectivistic manner. One may ask, then, if such procedures should be seen as a challenge to the systemic autopoiesis of the functional subsystems or of specific organisations. But do such procedures constitute processes of de-differentiation? I believe – and take as a working assumption – that this is not the case. At the very least, one needs to be highly specific about what one labels de-differentiation or erosion of the borders between different communicative domains. The central distinction is again one between functional subsystems and organisations.

The functional subsystems are, in the chosen approach, considered as evolutionary products, which are very stable and extremely unlikely to be circumvented. In this perspective arguments about de-differentiation or code-syntheses defy their own diagnosis. One can

only talk about the circumvention of, for example, the autonomy of the production of scientific knowledge or the rule of law, if such codes as truth or justice are taken as existing. Otherwise we encounter serious problems, both linguistic and descriptive. De-differentiation can only be rendered meaningful on the basis of a reasonably well-defined understanding of differentiation, which I take to be a well established feature of modern day semantics.

This, however, does not rule out that on an *organisational level* there is ample opportunity for the intermingling of communications proceeding in different codes – as well as clashes between different codes or framings (more about framings below). For instance, there may well be a challenge to the possibility for organisations seeing themselves as primarily 'scientific' to ignore the non-scientific aspects and consequences of their activities. They may not, as organisations, be able to abdicate responsibility for the application of scientific knowledge. This, however, does not mean that the defining distinction of scientific communication (true/false) is fundamentally negated. It means that the *organisations* change the code of their internal communication. Scientific organisations may, for shorter or longer periods, (be forced to) orient their communication towards an economic, political or legal code rather than a truth code. This has been called the politicisation of science (Weingart 1997). What this means, however, is that the focus of communication has changed character, not that the truth code has been invalidated or circumvented. This would be that case only if decisions on 'truth-issues' were decided by means of political or legal communications; if, for example, parliaments voted or courts ruled on scientific disputes. This, I believe, takes place extremely rarely and is most likely to be sanctioned as an illegitimate use of discretion on the side of political or legal organisations and met with immunising reactions in scientific communications. I therefore take as a working assumption that any diagnosis of de-differentiation must be located at the organisational level, not at the level of the functional subsystems. This may cause disturbance and frustration – or excitement and advantages – in organisations. It does not do away with functional differentiation as the dominant operational principle of modern societies.

The procedures to be explored in more detail can be considered – indeed, if they are to fulfil their purpose they must be – as 'poly-contextual discourses'. That is, they need to develop and nurture the ability of their communicative processes to more or less simultaneously consider the expected effects of their selections in several communicative domains. This is why I suggest the procedures should be considered as interactions and organisational systems, *conditioned* but not *determined* by the existence of functional subsystems. These communicative systems can be temporary, i.e. organised for specific purposes and within designated temporal limits, or more permanent. Such communicative procedures are often brought about by different organisations together (through structural couplings with co-present individuals). In the communicative processes the organisations involved (who have some kind of 'organisational identity') can and will pursue strategies, although they

obviously will not be able to determine the course of the communicative events, which will inevitably be the intermingled product of communicative contributions from many such organisations, and in some cases particular individuals, the outcome of which is difficult to predict.

In sum, I argue that systems theory assumes that communication is autopoietic, and that the elements necessary for the communicative processes must be produced and rendered applicable within the communicative processes themselves. However, that systems work autopoietically implicates neither that they are wholly oblivious to effects or events in their surroundings,[92] nor that they are causally determined. Such implications would render empirical research futile – and would obviously fly in the face of all experience.

Therefore, although working within a systems theoretical framework focussing on functional differentiation as the central characteristic of modern society, the aim here is to consider how communication on biotechnology and its regulation is differentiated into particular forums which cut across the modes of observation of the various functional domains of modern society. These separate domains are then seen as conditioning factors and providers of discursive resources, not as determinants of the communicative dynamic of the processes under investigation. Hence, the main focus will be on the *organisational* aspects of the processes of public involvement, that is how the perceived need for larger public involvement (in itself a specific semantic from) has been transformed into organisational processes facilitating particular modes of communication.[93]

The ambition is therefore to investigate in some detail how the class of procedures chosen for closer examination unfold in reality. In doing so, I shall make use of the general assumptions discussed in Chapter III and so far in this section. However, I shall also make use of some of the more specific concepts and distinctions explored in Chapter III in undertaking a systematic comparison of different solutions to some of the controversies outlined in Chapter I, which will be expanded upon and specified in the individual case studies.

The theoretical explorations in the previous chapter focused on three major themes of relevance for the analysis of technological controversies: a sociological understanding of risk based on the distinction between the modes of observation of decision-makers and

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[92] Only they observe these events and effects according to their own criteria of relevance, not necessarily as intended by other organisations.

[93] Here I largely follow the suggestion of Schimank (1988, see also 1995) to consider the codes and modes of operation of the functional systems of society as 'actor fictions' (Akteurfiktionen), i.e. the codes or 'framings' actors perceive as 'real' – as conditioning their selections – and thereby reproducing them. As such, 'intentionality' (e.g. goal oriented, strategic behaviour) is possible throughout for an organisation, but not for a functional subsystem. A research organisation can 'act', 'science' as such cannot. But of course actors can – as we shall see – claim to act or speak on behalf of 'science'.

those affected when decisions are made under uncertainty; the analysis of trust as a (generalised) willingness of social actors to allow others to make decisions on their behalf; and finally the cultural theoretical claim that differing forms of social organisation result in different and (possibly) incommensurable worldviews, which produce biases enabling selections when faced with uncertainty. These three themes will be operationalised as the focal points of the description and analysis of the cases.

The assumption is that procedures that are communicatively and organisationally differentiated with the purpose of mitigating technological controversies through inclusionary means all express particular choices on issues pertaining to what I shall call a risk controversy thematic, a trust thematic and a mediation thematic, which are to be accounted for in the analyses. Arguably, these are issues that all of the procedures of the kind investigated here must – implicitly or explicitly – address. Hence, these thematics form the common template for the empirical enquiries.

The *risk controversy thematic* has to do with how the distinction between decision-makers and those affected by their decisions is reconfigured in such procedures, and how this is legitimised. The aim is to establish what assumptions underlie the claims that the activities and the participants in the procedures are better able to represent 'the public' and can facilitate 'better' decision-making than traditional modes of policy making.[94]

The *trust thematic* has to do with how the procedures plan to contribute to the facilitation of the willingness of 'the public' to delegate competence to particular decision makers or decision making forums to make collectively decisions affecting all in a legitimate manner.

Finally, the *mediation thematic* has to do with how the procedures are designed to mediate between the incongruent and possibly incommensurable observations and assessments of the technologies in question and the risks affiliated with them, which are held by different (types of) organisations and collective actors.

If these three thematics are cross tabulated with the systems theoretical claim that all communications make reference to three meaning dimensions, namely *social*, *temporal* and *substantive*, the following scheme emerges, in which I have formulated a number of 'operative' questions to be asked of the individual case studies. These should help to characterise the cases in analytically relevant aspects and render them comparable:

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[94] In order to avoid semantic misunderstandings, everything in the procedures and the wider social controversies may be argued to be to do with 'risk', especially if this concept is understood as pertaining to uncertainties regarding the physical and social effects of the technologies in question. However, the labelling of this analytical dimension is specifically derived from the Luhmannian discussion regarding the distinction between risk and danger, which in social terms translates into the distinction between decision-makers and affected.

Theory-derived thematic aspects of the procedures / Meaning dimensions of involved communication	Risk controversy thematic Envisioned flow of information from affected to decision makers in procedure In short: Principles of Inclusion	Trust thematic Basis of delegation of competence from affected to decision makers aimed at in procedure In short: Principles of Delegation	Mediation thematic Envisioned principle of mediation of diverging perspectives In short: Principles of Mediation
Social	Who sets the agenda for the debate? Who is included in the procedure?	Through what mechanisms is the willingness to delegate regulatory competence envisioned to be strengthened through the procedure? What (if any) control mechanisms will the procedures install – what possibilities are there to withdraw trust?	Are there distinct social bases for different perspectives on the issues? How are these mediated?
Temporal	When are concerns taken up and addressed?	Is a build up phase for the establishment of trustful relations envisioned?	Are there diverging temporal framings of the issues at stake? If so, how are they reconciled and whose temporal perspective prevails?
Substantive	What issues are seen as fit to be on the agenda of the procedures?	For which issues is delegation seen to be required?	Is there a dominant cultural pattern underlying the procedures?

Obviously, I do not claim that the above provides any exhaustive list of the design considrations such procedures entail, nor of the aspects on which they can vary. However, the heoretical reflections have, I believe, established that these issues must be considered essential for such procedures, as they pertain to the core functions the procedures are intended to fulfil. In order to enhance the understanding of the dynamics of such procedures n general, the cases should ideally be selected so as to span a significant variation across hese dimensions.

he attempt to answer these questions for the individual cases will form the common opational framework for the investigation. The scheme should help, on the one hand, in tablishing that the cases, despite significant differences, can be seen as cases of the same ind' and hence are comparable. On the other hand it should also help to ensure that sig-

nificant variation is identified. Exactly because the cases are in many respects different, I aim to remain as sensitive as possible to their individual characteristics. Therefore, the cases are all structured via an initial descriptive and chronological mode of observation, which seeks to bring out the particularities, and is followed by an analytical section seeking to provide answers to the questions posed in the table above. After this selected aspects of the cases will be compared more explicitly in a separate chapter.

The theoretical considerations in Chapter III identified a number of potential challenges to such procedures, circumstances that may make it difficult for such procedures to fulfil their self-prescribed purposes. Part of the purpose of the empirical investigation is furthermore to explore if and when such challenges are found in the actual application of such procedures. To anticipate the studies, this is, arguably, the case, but to different extents across the different cases. I shall therefore use each of the cases to explore one type of challenge in particular where it is particularly pronounced. Subsequently it will be demonstrated that these challenges can be seen to be present in some form in all cases. These challenges I label, respectively, the problem of resonance, the problem of inclusion and the problem of mediation. These thematics are identified, observed and labelled in accordance with the applied systems theoretical framework, although their actual specification is empirically derived. Therefore, the discussion of these issues will emerge from the actual studies rather than being anticipated here.

Methodology

As should now be clear, the empirical part of the study is based on case studies, all of which focus on events that are flagged as processes aimed at increasing public involvement or the uptake of public concerns in policy making regarding agricultural biotechnology. By *events* I understand communicative processes that can be fairly accurately delineated in the social, substantial and temporal dimensions. It is clear who participated, what was being communicated about and when the processes began and ended. The events were observed by the participants and the addressees as events, and they all produced 'outputs' in terms of reports and other communications (not to be equated with the 'effects' of the events). However, the processes I wish to study cannot be adequately understood as abstract from the contexts in which they are situated. Therefore, the description and characterization of the contexts surrounding the events will form an important and integral part of the case studies. As will become clear, the cases (event and context together) do not necessarily have natural or self-evident contours, they do not emerge as fixed and self-contained sets of data, like survey data or transcripts of interviews or focus groups discussions. As such, the delineation of the cases is to some degree observer dependent, based on my assessments of and decisions about what 'belongs' to the cases and what does not. In my opinion no unambiguous rule can be devised for deciding what communication 'belongs to' or 'is relevant for' the cases. It will inevitably be a matter of selectivity based on the observers'

research interests, knowledge of the cases, and the material compiled. I hope, however, that the reader will be convinced that the cases are explored and documented sufficiently to warrant the conclusions drawn. This does not mean that selections have been made randomly. In the previous section I presented some of the operational considerations that guide the enquiry, and in the following I shall briefly present some of the methodological considerations that inform the case studies in general. More specific choices will be explained in the next three chapters.

In line with the assumptions derived from the theoretical discussions in the previous chapters, where *communication* is made central in social analysis, it is the communicative dynamic of the processes that lead to and make up the procedures of public involvement that is of central interest. To analyse such processes I consider a type of *discourse analysis* the most suitable methodology. However, as discourse analysis is a contested concept in the social sciences, it seems necessary to briefly explicate how I understand and use the concept and reflect upon how it fits together with the theoretical framework of the thesis.

By *discourses* I understand repertoires of communicative expectations, structures of meaning that enable speakers to link together series of utterances in ways that are likely to be meaningful and thus form the basis of continued communication for listeners (this is of course not limited to verbal communication, but applies equally to texts). As such, discourses are formations of meaning that are already, in part, defined and can be drawn upon as repertoires, whereby communication can proceed with fewer complications and more limited contingencies. At the same time, discourses typically carry series of connotations, which are then implicitly 'brought along' (but not actualised) in communication. In relation to the Luhmannian concept of meaning, discourses can be understood as *condensed meaning*, where certain pre-selections have already been made and the horizon of further communication is circumscribed (as a matter of likelihood, not determination).[95]

Thus understood, discourses are seen to operate *within* systemic contexts of communication, be it interactions, organisations or functional systems. Discourses are not themselves systems, they depend on the autopoiesis of social systems to be activated (Bora 1999: 165). However, they can be understood as making up or expressing the internal structures of social systems in providing or producing expectations that guide communication within all types of social systems. In functional systems discourses are typically located at or 'below' the programmatic level (and not on the level of codes). As such, several (competing) discourses may be at work within the same functional system, without the system losing its identity. For example, competing theoretical and methodological approaches compete within the scientific system, but all operate on the basis of the truth/false code that defines

[95] This hence entails a more 'benign' use of the concepts of discourse than is found for instance in the post-structuralist approach of Foucault and research inspired by him, where discourses are more or less immutable epistemes regulating what can be communicated at all in a given period. As I use it, the concept of discourse is therefore not as theoretically loaded as in certain other approaches.

the scientific system, just as several (party) political programmes based on different ideologies (which are also structures of condensed meaning) can contend for the same positions of power within the political system, or split markets with different pricing mechanisms can co-exist in the economic system.[96] However, at the level of interactions and organisations it is always possible and very likely that different discourses may collide with each other in ways that seem incommensurable. Mutually incompatible expectations of what counts as an appropriate communicative contribution can compete within interactions and organisations, and the dominance of one discourse over another may depend on relationships of power between (collective) actors.[97] This dominance is then not dependent upon the 'force of the argument' in the Habermasian sense, but on the ability to create resonance, which may depend on a multitude of factors, argumentative or otherwise. Discourses can, but need not, make reference to the code of a specific functional system. As such, there may be discourses that can only or are primarily found in the communication affiliated to a specific domain, for example scientific discourses of 'truth' are likely to create only little resonance in other domains, e.g. economy or politics. However, discursive formations may, through the intervention of interactional and organisational systems, span more than one functional domain. An example could be the discourse on 'participation', which carries rich connotations and references, and can find applications in the political, scientific, legal and economic systems, just as discourses on 'risk' appears to resonate in still more communicative domains.

As discourses are understood as ensembles of arguments and distinctions they are not easily captured empirically. We must then step down a level and consider *framings* or *frames* as the unit of analysis through which discourses can be approached. Frames can in the present theoretical context be understood as the individual distinctions by which communication proceeds. They can make use of or refer to 'objects' or 'concepts' in the way introduced in the previous chapter, distinctions that have an implicit or explicit other side which is always co-processed when the frames are activated. When speaking of 'frames' it is often implied that they carry rich connotations, that they represent 'symbolic packages' (Eder 1996b: 166-71). Discourses or discursive formations (used interchangeably here) are then made up by ensembles of frames.

If we understand 'frames' as *distinctions with implied further references*, it is possible to analytically distinguish between what I would call the conscious or strategic use of frames and a more unconscious or aggregated use of framings as the indispensable use of distinctions in communication. Eder (ibid: 169) reserves the word 'frames' for the manner in which collective actors deliberately/strategically use frames in order to further their causes and

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[96] For example GM and non-GM food mean different things to consumers and are hence priced differently.

[97] Or, rather, power can be understood as the ability of one party to a communicative process to make his or her distinctions and selections the basis upon which further communication proceeds, whether the other party finds this desirable or not.

achieve their goals. 'Discourses' is then designated for the emergent effects of use and collision of different framings in the public space. Here I will not follow this nomenclature, as I prefer to use 'frames' as the analytical unit of discursive formations independently of whether they are propagated consciously/strategically or not, as I expect that the distinction may be difficult to trace empirically in a reliable manner (how does one decide whether a frame is propagated strategically simply because it belongs to the controlled repertoire of a collective actor or to the uncontrolled but constraining context of a larger cultural collective?).

A different set of distinctions is found in Schön and Rein (1994), who distinguish between, 'rhetorical frames' and 'action frames'. Rhetorical frames are used for purposes of persuasion whereas 'action frames' are used to actually formulate policies, as "frames implicit in the language used to "win the allegiance of large groups of people" differ from the frames implicit in the agreements that determine the content of laws, regulations, and procedures" (ibid: 32). Secondly, Schön and Rein distinguish between three levels of action frames; policy, institutional action and metacultural frames, where "(a) policy frame is the frame an institutional actor uses to construct the problems of a specific policy situation", "(a)n institutional action frame is the more generic action frame from which institutional actors derive the policy frames they use to structure a wide range of problematic policy situations" and finally "(in)stitutional action frames ...[are] local expressions of broad, culturally shared systems of belief, which we call metacultural frames." (ibid: 33). Schön and Rein make it clear that "(i)n terms of practical methodology, it may be difficult to tell, in an actual situation, what frame really underlies an institutional actor's policy position" (ibid: 34-35). Likewise, the same action may be consistent with different frames and the same frame can lead to different courses of action. Nonetheless, it will be the interpretive task of the case studies to explore just how such different types of frames compete and interact. It may then be a matter of interpretation whether (or when) the participatory and deliberative semantics that arguably inspire the kind of procedures investigated here should be considered as specific policy frames, institutional action frames, or meta-cultural frames. Arguably, in different guises, they may work on all three of these levels.

If one takes framings as the analytical units of discourses, it seems obvious that not all frames are propagated consciously by collective actors, some are clearly an 'incorporated' element or set of distinctions in their operations – they are integral elements of their 'culture'. They allow collective actors to operate, they are not something that can be chosen at will. On the other hand, not all communication is innocent and some 'framings' are applied strategically to achieve aims (as is particularly obvious in political 'spin'). For an external observer, however, it is difficult to assess exactly when this is the case and if it is in fact a

clear-cut distinction in empirical reality.[98] However, this need not inhibit or invalidate research, as the effects of communicative contributions can be observed independently of whether they are 'authentic' or 'strategic'. Here I again propose to take the position of a second order observer and not (necessarily) try to assess the motives of the involved organisations, but rather to observe how communication is observed by other actors.[99]

Finally a note on what is particular of the approach in this thesis. Where most of the literature (known to me) using frame analysis take 'the public' more or less as a *location* or *medium* in which struggles between different framings are played out (the public sphere or arena), and hence focus primarily on the substantive content of the 'symbolic packaging', the focus here will be to explore the discourses and framings involved in *defining* processes of public involvement, what I have called the operationalisation of the public. This entails a strong focus also on the social dimension of such procedures, and the organisational features of the embodiment of deliberative and participatory discourses in social procedures will be thoroughly explored.

Selection of Cases

I have already hinted several times at the empirical enquiries to be carried out in the following. In what remains of this chapter I shall describe and motivate the way in which the explored cases were selected for examination. For several reasons, it seemed clear to me from the outset that the kind of questions I was interested in could best be explored through in-depth studies of a limited number of cases. The research question of the thesis concerns the relationship between problems' settings, the internal dynamics of participatory procedures and their effects (or lack of the same) in policy contexts. This was to be analysed on the background of an explication of the normative and functional expectations attached to such procedures and an analysis of the sociological importance and effects of (technical) risks in functionally differentiated, modern societies, which, I have argued, are among the primary causes for which such procedures have evolved. In order to fulfil this ambition it seemed that a relatively detailed level of analysis was necessary, which it did not seem feasible to pursue through statistical analysis. Hence a qualitative research design was opted for.

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[98] Cultural Theory would suggest exactly that what for some organisations are 'natural' ways of observing themselves and their environment may for others seem either purely irrational or solely strategic communication.

[99] For the observation of participatory procedures staged to be argumentative and deliberative rather than strategic, one might also argue that the distinction is relatively unimportant: "Dabei ist relativ gleichgültig, ob die Beteiligten beim Argumentieren eine strategische oder kommunikativ-argumentative Einstellung einnehmen, weil Einseitigkeiten/Halbwahrheiten durch die Präsenz anderer Wissensbestände/Positionen korrigiert werden. Die Diskurse verlaufen also auf jeden fall so, *als ob* sie argumentative orientiert wären." (Döbert 1997: 207).

I also chose from the outset to focus on non-human biotechnology. This ensured that differences found between the cases could not be ascribed to differences in the subject matter of the procedures to be looked into. The 'topics' of the procedures were to be similar enough to consider them identical, although of course differences in the specific framings they received is of significant interest. The focus on agricultural biotechnology also ensured that the level of articulated societal controversy was high compared to other domains of technological innovation across the cases. Of course the public controversies are not 'identical' across the cases, but I will argue that the level of antagonism regarding GMOs in the respective public spheres can be considered a constant in the research design.

These choices made the universe of potential cases to be explored limited (especially when focusing exclusively on agricultural biotechnology), but still too large to enable me to explore all of them at the level of detail I found desirable.

I worked out the following list of potential cases, all of which could be argued to fall within the universe I was interested in exploring (only European events were considered). These were all flagged as procedures aiming to establish policy advice on non-human biotechnology in 'untraditional' manners based on either the active involvement of 'the public' (lay citizens) or an elevated inclusion of participants/stakeholders. They are also all based on 'deliberation', at least to some extent (selected cases in bold):

Name of procedure/event	Institution/country	Year	Format of procedures	References
Technikfolgenabschätzungsverfahren transgene Herbizideresistenz	Wissenschaft Zentrum Berlin, Germany	1991-1993	Discursive procedure among stakeholders	Van den Daele et al. 1997
Biologische Sicherheit bei der Nutzung der Gentechnik	Büro für Technikfolgenabschätzung beim Deutschen Bundestag, Germany	1991-1993	Stakeholder dialogue	Gloede 1997
Publiek Debat (on genetic modification of animals)	NOTA (Dutch TA organisation), The Netherlands	1993	Danish style consensus conference	van Est et al. 2002
UK National Consensus Conference on Plant Biotechnology	Science Museum London, The UK	1994	Danish style consensus conference	Purdue 1996, 1999; Joss 1995, 2002
Bürgerforum Biotechnologie/Gentechnik	Akademie für Technikfolgenabschätzung, Baden Württemberg, Germany	1995	Citizens' panels debating with experts ('Plannungszelle')	Grabe and von Schell 1995; Gloede and Hennen 2002
Lekfolkskonferanse om genmodifisert mat	NENT (National Research Ethics Committee for Science and Technology) Norway	1996	Danish style consensus conference	Kaiser 2000
BioTIK	Ministry of Trade and Industry, Denmark	1996 onwards	Ethics-commission and public debate-stimulation	Chapter V
Volksbegehren	NGOs and newspapers, Austria	1997	Public debate and petition (1,23 million signatories)	Schneider 2000
Conférence de Citoyens sur l'utilisation des organismes génétiquement modifiés (OGM) en agriculture et dans l'alimentation	Office Parlementaire de l'Evaluation des Choix Scientifiques et Technologiques, France	1998	Danish style consensus conference	Marris and Joly 1999
Gen-Schutz Initiative	Various NGOs, Switzerland	1998	Referendum	Schneider 2000
The Citizen Foresight on the Future of Food and Agriculture	Genetics Forum (NGO) and University of East London, the UK	1998	Citizens' Jury	Joss 2002
PubliForum "Gentechnik und Ernährung"	TA-Programm, Switzerland	1999	Danish style consensus conference	Schwab 2000
Public consultation on developments in the biosciences	Office of Science and Technology, UK Government, the UK	1999	Citizen's discussion groups + Survey research	Irwin 2001
Konsensus konference om genmodificerede fødevarer	Danish Board of Technology, Denmark	1999	Consensus conference	Chapter V
Diskurs Grüne Gentechnik	Bundesministerium für Verbraucherschutz und Landwirtschaft, Germany	2001	Stakholder dialogue	Chapter VII
GM Nation?	Agricultural and Environmental Biotechnology Commission	2003	Public debate, scientific review and economic forecasting	Chapter VI

In this situation I was faced with the dilemma that, on the one hand, qualified choices require as much knowledge of the cases as possible, but, on the other hand, this knowledge

will typically only be available once the choices have been made and the compilation of data begun. Hence, the choice unavoidably had to be made on the basis of incomplete information. When one can neither embrace the complete universe of cases, nor make a statistically valid sample, the choices are to some extent arbitrary. Much in line with the thematic of the thesis, one could say that it becomes risky!

However, there were additional criteria and assumptions on which the selection was supported. Apart from the fact that the chosen methodological approach required certain linguistic skills, other considerations pertaining to the contexts of the cases were made as well, which I will argue made the selection somewhat less arbitrary.

The research topic of the thesis is motivated by sympathy for the arguments in favour of increased public involvement in the governance of science and technology, but also some sociological reservations about the ability of such procedures to fulfil their self-proclaimed ambitions. As most of the theoretical and normative arguments for procedures of increased public involvement are (surprisingly?) silent about the political-cultural and institutional prerequisites for the successful application of the envisioned procedures, there are no hypotheses *a priori* (from the *normative* perspective of the advocates of increased public involvement!) about how and if the potential challenges such procedures will be faced with may or may not vary systematically in modern democracies.[100] As such, the participatory and deliberative postulates explored in Chapter II do not themselves deliver criteria for the selection of cases.

It can be argued that *if* the purpose of the thesis *had been* a comparative study of the susceptibility of different political cultures and institutional arrangements to such procedures, it would have been preferable to seek procedures that were very similar in procedural aspects and compare how these were adapted in different contexts.[101] This would have allowed for the most controlled examination of the relationship between political culture, institutional set up and the effects of such procedures.

However, the aim was, rather, to explore the organisational and institutional *diversity* in how 'public involvement' can and has been actualised in order to investigate the challenges such procedures are faced with in a broad and encompassing sense rather than as related to one specific procedural design. Hence, the intention was to ensure a certain *variance* in the pro-

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[100] This is perhaps so because these contextual features are not considered objects of deliberate change (at least in the short run), e.g. if one argues in favour of more public involvement in policy making in the UK, inspiration can be sought in Denmark, but it can hardly be argued that the background conditions in the UK 'ought' to be more like Denmark.

[101] See e.g. Einsiedl et al. (2001) for an – albeit not particularly convincing – comparison of the use of the Danish style consensus conference format in three different countries (Denmark, Canada, Australia).

[101] While of course making sure that the procedures were still relevant examples of processes claiming to include public concerns closer in policy formulation through participation/deliberation.

cedures investigated.[102] This variance should, preferably, be on dimensions expected to be significant according to the theoretical considerations outlined in Chapter III and operationalised above. At the same time I aimed to find procedures that were *important* in their respective national contexts. Importance is of course a complex, non-trivial criteria and difficult both to define and to establish, especially prior to the actual investigations. However, following the increasing interest in participatory and deliberative formats of policy making a number of 'experiments' have been carried out in several European countries, some of which are rather distant from actual policy institutions, for instance by university academics and NGOs of various kinds (Joss and Bellucci 2002). My ambition was to look at procedures where at least the potential for effects were clearly present. Two meanings may be drawn from the phrase 'potential for effects'. In a wider sense, (desirable) 'effects' can be understood as the self-prescribed aims of the procedures, namely to contribute to the mitigation of lingering controversies over technology, in order that trajectories of technological development be rendered more legitimate in eyes of 'the public'. At the more operational level (which is often entailed in the criteria of success envisioned by the procedures/organisers) this is most often understood as effects on (political) decision makers, that specific framings (issues, problem-definitions etc.) are transferred from the procedures to the centres of policy making – and make a difference there. Although effects from the procedures could in principle be detected in different sectors of society (science, economy, law etc.) the focus will predominantly be on policy and regulation. The effects on actual policies are often seen as a necessary (although not necessarily a sufficient) condition for mitigating controversies. On the basis of this criterion it seemed desirable to seek out procedures rooted in organisations with reasonably close institutional links to policy-making. This also meant that the procedures should not be too 'alien' to the political environment in which they were located. Finally, for reasons of expediency (access to material, memory of participants etc.) it seemed preferable that the cases should be relatively recent.

In the end, cases were selected from Denmark, the UK and Germany, which I assessed to be the most interesting to examine more closely. They all had the advantage of been fairly recent events, but also providing the opportunity of contrast with earlier events in the same national settings, i.e. as products of some degree of social learning. I shall not expound on the cases in any detail here, as they will be thoroughly motivated, described and analysed in the following three chapters. A few remarks may however be required to justify the set of cases as a *set*.

The cases can all be seen as deliberate deviations from the standard modes of technology policy making in their respective contexts, albeit the Danish case less so than the British and German. As such, they are attempts to experiment with new institutional forms, which

[102] While of course making sure that the procedures were still relevant examples of processes claiming to include public concerns more closely in policy formulation through participation/deliberation.

in the applied Luhmannian evolutionary vocabulary can be interpreted as deliberate attempts to induce variation in institutional formats that may eventually, over time, stabilise themselves as more ordinary modes of operations in the policy arenas. As such, they all have 'experimental' policy objectives in common. I also take them all as indicative of strategies to move from policy regimes based on 'strict' couplings towards more 'loose' couplings in the arrangement of inter-systemic coordination in the regulation of biotechnology (in the sense explored towards the end of Chapter III). This is so because the procedures, in various ways, invite greater flexibility in the modes of observation that guide technological choices.

Denmark is known in the literature (often mentioned along with the Netherlands) as one of the front-runners in experimenting with participatory forms of governance of science and technology. Hence, Denmark provided the opportunity to include one of the countries where such procedures appear to be most integrated into policy making. The consensus conference format invented in Denmark has been widely discussed as an ideal typical model of how the viewpoints of 'ordinary citizens' can be included in policy discourses. Hence, it seemed like a good idea to look at the format in its 'natural' setting.[103]

The procedure central to the British case took place during the work on the thesis, and I had the opportunity to follow the process relatively closely as it unfolded, which provided me with rich material. The British procedure is not typical of how science and technology policy has traditionally taken place in the UK. The fact that this procedure took place in the way it did must be ascribed to the shock released by the BSE scandal in Britain. As such, it may possibly herald a new way of doing things in Britain, as the procedure turned out to be relatively influential in subsequent policy debates.

Finally, the German case represents a more corporatist arrangement than the other two cases, which appears to be well in line with the German political culture. However the procedure also exhibited a significant touch of participatory and deliberative elements, which must be considered less conventional in the German context.

Hopefully, without pre-empting the actual studies too much, it can be argued that on what I label the *risk controversy dimension* the cases display quite different solutions to managing the decision maker/affected interface. They range from a rather uncontroversial use of a very small panel of lay people in the Danish case, a quite controversial use of general inclusion in the British case, and a deliberate choice to activate only the organisational representatives of those affected (in various respects) by regulation in the German case. Likewise, the *trust dimension* spans variation in the ways the procedures are envisioned to establish legiti-

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[103] It would be deceptive to deny that the fact that as a citizen of Denmark choosing Denmark as a case seemed natural and expedient. However, it also played a role that as a Dane I was always a bit puzzled by the attention Denmark had received in the discussions about technology assessment as I was somewhat sceptical about the blessings of consensus conferences. Hence, it seemed obvious from my personal perspective to include Denmark in a study where I could compare it to how things were done elsewhere.

macy in decision making. The Danish procedures emphasised political attention to 'ethics' as well as 'common sense' as articulated by lay people, the British case scientific competence, and the German seeing the road to public acceptance as via the organisational landscape. Finally, in order to mediate between conflicting views on and interests in biotechnology, the different procedures employed quite different social mechanisms. The Danish case again emphasised the 'unitary' common sense of ordinary people, the British case a separation of the debate into quite distinct meaning domains, and the German procedure a search for regulatory principles abstract enough to ensure the consent of major stakeholders.

The three cases – seen in their respective contexts – deliver, I believe, the possibility for the investigation to span a spectrum of organisational forms of public involvement procedures in terms of the configuration of stakeholder/lay-elements, institutional anchoring, size and representativity of the exercise as well as different uses of scientific expertise in such events. As such, their analysis should be able to deliver insights into the possibilities and limitations of the use of participatory and deliberative mechanisms in the governance of science and technology in a highly detailed manner.

In addition to spanning a certain, and in my opinion interesting, organisational space of such procedures, the selection of cases from Denmark, the UK and Germany also – and perhaps not incidentally – covers different political-cultural and institutional traditions which, according to comparative social research entail significant differences (e.g. Esping-Andersen's (1993) distinction between a 'social-democratic', a 'liberal' and a 'corporatist-statist' welfare-state regime). This assignment of the three countries to different clusters of political cultures and institutional traditions is also found in other comparative work (e.g. Crouch 1993, Torgersen et al. 2002 regarding biotechnology). This is not in itself an active component in the research design, but it corroborates the assumption that interesting differences may be spanned through this selection of cases.[104] It is not an aim in itself to pursue in detail to what extent the susceptibility to public involvement in science and technology governance in my cases is correlated with a more generic variance of political culture or institutional structure. The focus is more directly on the operationalisation of public involvement in particular modes of communication of participatory/deliberative procedures and how they are perceived by their surroundings. In doing so political culture and institu-

[104] From the perspective of comparative social science a more complete study could arguably have been achieved through inclusion of cases from the more statist French context and a case from southern Europe. Apart from the linguistic challenges this undoubtedly would have caused me, another problem would be the lack of suitable events to centre the cases around. To my knowledge France has only had one event that falls within the category investigated here, namely a Danish style consensus conference undertaken in 1998 (Marris and Joly 1999). This was in many respects an interesting case, but it seems that it is best considered as somewhat of an institutional outlier in the French context (ibid). Hence, I chose not to examine it in any detail. As regards southern Europe, it seems that participatory and deliberative ideals have not really had any trenchancy here pertaining to agricultural biotechnology, which has until recently been a lot less controversial compared to northern Europe.

tional structure are more generally relegated to the status of 'contextual features' of the individual cases rather than explanatory variables investigated as such. In short, the purpose is not to establish if and how different policy contexts respond to 'the same' type of technological controversies, but to explore how the co-occurrence of the GM controversies with the circulation of participatory and deliberative discourses and ideas has led to different policy innovations – the establishment of specific, inclusionary contexts of communication – and whether this has led to different outcomes in terms of their use in policy making and in popular acceptance of such policies.

A consequence of this is that the cases, on immediate consideration, are rather heterogeneous. Therefore the necessary accounts of their respective contexts will not subscribe to a common template as might be expected from a comparative study. Not all the same contextual factors are considered in each of the cases, as the primary aim is to provide 'thick descriptions' of the cases in order to make them accessible and comprehensible to the reader, rather than seeking to force them through a common matrix. Arguably, the driving initiatives for the procedures came from different 'places' in the national contexts, which has as a consequence that the descriptive sections do not all focus on similar contextual features. I hope nonetheless that the preceding theoretical reflections on the background of technological controversies and the common intellectual inspiration arguably underpinning the procedures, as well as the analytical dimensions developed, will convince the reader that it is in fact meaningful to compare the cases as different but functionally equivalent responses to technological controversies.

One final disclaimer may be in order here. Because of the wish to select cases that at the outset appeared 'important', I have arguably also selected cases that are rather well adjusted in terms of organisational features to their respective political cultural contexts. As it is known that in these contexts other experiments have also taken place – not only in various technological domains, but across a number of policy domains – with different participatory/deliberative modes of policy making (or policy preparation), it does not seem feasible or reliable to seek to explain the selected formats as causal products of the political cultural contexts in which they are located. I will at times hint at affinities between the wider political culture and the format and use of particular procedures, but the concept of political culture will predominantly be used to explore the dynamics and effects of the procedures rather than their design.

Finally, a few words on the compilation of the empirical material is required. As the investigation is carried out via *case studies* I have deliberately chosen a rather eclectic approach to the empirical material. The aim has been to interpret the dynamics of the individual cases as well as possible, and to use any available evidence for that purpose. Several types of material have therefore been used to piece together the descriptions of the processes investigated. I have obviously used textual material which is not prepared for research purposes,

such as policy documents and news reports (typically first order observations), but I have also drawn upon existing research literature documenting some of the objects of interest (second order observations). Furthermore, I have conducted a number of interviews with various people involved with the procedures under investigation in one way or another. These are what one could call 'expert-informant' interviews – as distinct to research interviews in the interpretive, qualitative research tradition – as they aimed primarily at gaining an insight into processes, and not at exploring the world-views of the informants. However, at times they will also used to explore differences in how the various organisations frame the processes and contexts in which they have participated. As the interviews were conducted with representatives of organisations that are clearly identifiable, it would make little sense to render the informants anonymous (and they have not been promised, nor did they request anonymity).[105] Finally, in one of the cases (the British) I was able to undertake participant observation at public meetings, which was not an option in the two other cases. As such it can be said that the study does not ascribe to any particular research methodology, but has proceeded pragmatically in order to construct the body of empirical matter on which the study is based.

[105] See list of interviews conducted in appendix.

Chapter V

The Problem of Resonance – The Danish Case

The central empirical interest of the thesis is to investigate the relationship between public concerns about biotechnology, framings of 'the public' in participatory events and the dynamic of biotechnology policy arenas. To briefly recapitulate; by participatory and deliberative events I understand communicative processes where the public (in one form or another) is, for a shorter or longer period of time, transformed from a passive audience of political and scientific communication into active participants (in one form or another) in the policy arena, with the aim that their 'concerns' be considered in policy making or mitigate controversy through 'dialogue'. As such, I am referring to processes where the assessment and regulation of new/risky technologies is deliberately expanded beyond technocratic circles or institutions with the purpose of increasing democratic accountability and/or mitigating controversy, and in particular processes which are provided with an organisational locus, thereby going beyond market based transactions and 'unstructured' communication in the public sphere. As was argued in Chapter III, in a systems theoretical perspective this can be understood as attempts to move from 'strict' to 'loose' couplings between the functional subsystems through the establishment of organised communicative processes with 'poly-perspectivistic' competences.

In the Danish case there is one particular institution – the Danish Board of Technology (DBT) – and one particular participatory format – the *consensus conference* – that has been central (but not exclusive) in the discussions about how to achieve increased public involvement in the assessment and regulation of new technologies. Consensus conferences as developed by the DBT have also attracted significant attention in international debates on public participation, and are often presented as paradigmatic examples of how increased public involvement with science and technology can be organised.

It is therefore instructive to consider the latest consensus conference on GM food and agriculture one of the pivotal points of the Danish case study. This is so for several reasons. Not only will it allow a thorough discussion of a particular participatory event in its context, it will also facilitate a discussion of the consensus conference format and the DBT as a particular TA institution, which can be compared to how the science/policy/public interfaces are dealt with in the other cases. Furthermore – as it seems that this particular participatory event did not achieve any significant direct political or regulatory resonance – it will facilitate a critical discussion of the potentials and limitations of such participatory events, both in practical and more structural terms, to achieve effects of the kind foreseen in their self-descriptions. Hence, with regard to the spectrum of challenges participatory and deliberative procedures are faced with, the Danish case will motivate in particular a discussion on what I call *the problem of resonance.*

However, neither consensus conferences nor the DBT is the only institutional initiative in the Danish policy arena that has addressed controversial aspects of biotechnology from the particular viewpoint of public concerns. Therefore, another major initiative by the Danish government to mitigate public concerns about biotechnology in general will also be discussed in some details. This is the *BioTIK initiative* initiated by the Ministry of Trade and Industry in 1997 with the formation of an expert committee on (bio)ethics, which was subsequently continued as a cross-ministerial task force to disseminate information and stimulate debate about biotechnology, and to work to coordinate and further the inclusion of ethics in the regulation of various applications of new biotechnologies. On the face of it this BioTIK initiative appears to have had a greater impact on the political discussions and discursive framings operating in the policy arena than the consensus conference. A closer look at this will assist me in a discussion of a particular mode of argumentation – ethics – which is often mentioned as particularly pertinent in relation to biotechnology, but which exhibits some particular challenges in regard to the problem of resonance.

The chapter is divided into two main parts, the first describing the historical background and development of the interaction between biotechnological development, political regulation and public debate in Denmark. This includes a general introduction to the DBT as an institution in the Danish political landscape, a description of consensus conferences as a participatory method and a discussion of their underlying assumptions or framings of 'the public'. The descriptive section will also include an account of the two central processes investigated, the BioTIK initiative and the 1999 consensus conference as well as an assessment of their impacts on the biotechnology policy arena.

The subsequent more analytical section will fulfil two tasks. First, it will attempt in a more analytical vein to contrast the two described processes according to their configurations in the social, temporal and substantive dimensions by providing answers to the operational questions posed in the previous chapter. I shall try to analyse why the 1999 consensus conference – given that it is often seen as an ideal typical participatory method, which in the Danish case was situated in a relatively open political context, where it has been accepted in the repertoire of policy tools – appears to have created very little visible resonance or policy impacts. Similarly, I shall discuss what difficulties the BioTIK commission encountered in substantially shaping the biotechnology policy agenda.

Secondly, I will take the two procedures as a starting point for a discussion of the issue of resonance and discuss more generally the challenges associated with ensuring resonance from such procedures. In doing so, I shall address the somewhat peculiar observation that, on the one hand, the two procedures did not appear to have much resonance with the wider contexts, and yet, on the other hand, the Danish policy subsequently pursued in this domain seems to be comparatively congruent with the attitudes of the population.

Structure and Dynamic of the Biotech Policy Arena in Denmark before 1996

As both the initiatives to be discussed claim an intimate relationship to the Danish political culture and context, it seems pertinent to briefly characterise this. The Danish political culture can – comparatively – be characterised as relatively consensual. Furthermore, it exhibits some corporatist traits, with social interest groups having a fairly strong influence on policy making (Jelsøe et al. 1998). This takes the form of consultations with a number of institutions and organisations when bills are proposed as well as a comparatively strong delegation of power to non-governmental negotiations and sectorial self-governance. For instance, the agricultural organisations have had a relatively strong influence on agricultural policies, especially through their historical links with the liberal party, and since the 1970s environmental organisations have established themselves as significant dialogue partners of the political system. In international comparison these corporatist traits are, however, somewhat moderated by the relative openness of the policy making process in terms of the transparency of the administration and the hearing rights of organisations. This is particularly the case in 'newer' policy fields, such as environmental legislation and regulation, where the inclusion and attention to various stakeholders and social movements has become quite significant since environmental issues emerged on the political agenda in the late 1960s and early 1970s. This political culture consisting of a mixture between corporatist negotiations and attention to various stakeholder perspectives has significantly shaped the social responses to new technologies in general and biotechnology specifically, as will be elaborated in the following.

Denmark joined the EC/(EU) in 1972 by a referendum with a small margin, and the country has ever since been quite sceptical and divided in its attitude towards European integration. Although there is a relatively strong parliamentary control over the shifting governments' negotiations in the Council, EU regulation is often claimed to lower high Danish standards of environmental and consumer protection in ways that are framed as undesirable, as it goes against the preferences of the majority of the Danish electorate. Scepticism towards the EU has been a significant factor in the debates over environmental and consumer protection policy, where it is often claimed that the EU leans towards a more lax regulatory standard than the Danish authorities and public would prefer. This EU scepticism has, sometimes latently, sometimes explicitly, been a sub-theme in recent debates about agricultural biotechnology accompanying the gradual transfer of regulatory competence to EU institutions.[106]

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[106] Danish political parties have, however, been quite cautious blaming the EU for the criticised regulationsin order not to aggravate public animosity towards the Union, the closer integration of which most of the traditionally governing parties are all in favour.

A number of Danish food and pharmaceutical industries had been working with biotechnology development long before the emergence of recombinant genetics, and the country has a comparatively strong knowledge base in biotechnology. There is a significant industrial and political wish to retain and strengthen this knowledge base, as pharmaceuticals and biotechnology are considered the 'technology of the future' and the sectors hoped to sustain and expand Denmark as a 'knowledge society'.[107]

In Denmark, as elsewhere, biotechnology policy and regulation, as well as public debate, has gone through different phases since the emergence of the field.[108] Here as in other European countries a relatively calm period in the first half of the 1990s was followed by what several observers consider a significant resurgence of public controversy in the late 1990s (Jelsøe et. al. 1998, 2001; Lassen et. al. 2002, Joss and Klüver 2001). This case study focuses on events from 1996 onwards, but in order to understand the background of these events – and in turn their effects – I shall briefly recount some general characteristics of the policy process and public debate until the mid-1990s, as they have significantly shaped subsequent developments.[109]

Debates about biotechnology took off relatively slowly in Denmark. The international Asilomar conference in 1973 on the safety of genetic research did not provoke any reaction in the political system (if it was noticed at all) and little media attention. Until 1983 the regulation was non-statutory and consisted only in voluntary registration and the monitoring of research by a commission set up by the Danish Research Council.

In the early 1980s industry started to apply manipulated microorganisms for process purposes, which on the recommendation of the research council and the then newly established Technology Council (later Board of Technology, see below) led in 1983 to the establishment by the Minister of the Interior of an advisory committee on gene splicing. The committee was to consider whether any regulation was required in this new area, and if so, to draft legislation. The committee came up with three drafts for regulatory acts, none of which where immediately taken into consideration. However, in 1985 when the two medical companies Nordisk Gentofte and Novo both stated their intention to use GMOs for insulin and enzyme production, the issue was put on the agenda, both in the public and in the political system. Due to the committee's work the political system was relatively well prepared to deal with the prospective challenges raised by biotechnology. Where most dis-

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[107] Due to the country's size, its industries are relatively small on an international scale. However, since the merger of Nordisk Gentofte and Novo to Novo Nordisk, this pharmaceutical company has a dominant position on the world market for insulin production and a leading position in the production of enzymes, and has been one of the engines of Danish biotechnology. This also means that it has been the pharmaceutical industry that has been the most visible advocate of biotechnology in the Danish public, whereas the agricultural and food industries have been less visible until recently.

[108] Jelsøe et. al. (1998: 30-32) differentiate between six phases, with varying degrees of policy activity and intensity of public debate.

[109] This section is based primarily on Jelsøe et. al. (1998, 2001).

cussion so far had been on ethical and human issues, safety and environmental concerns now moved to the centre of attention, and one environmental organisation in particular (NOAH) put biotechnology on their agenda and started debating and producing information about the prospects and potential problems regarding biotechnology. It was, however, still only the object of a fairly specialised public and politically not very significant.

In June 1986 the Danish parliament unanimously passed an act on all the three areas suggested by the advisory committee. This was the first law in the world to make gene technology a distinct regulatory domain, thereby taking a clear political stand in the discussion on whether GMOs should be understood as a significantly new technology or simply as more precise breeding/processing technology. A new, clearly *process-based* regulatory domain was opened up, but was not yet the object of party political strife. The law consisted of four main principles. 1) All deliberate releases of GMOs were banned, 2) the Ministry of Environment could under 'extraordinary circumstances' make exceptions to the general ban, 3) contained use must be approved by the Ministry of Environment and 4) all foods consisting of or containing GM material must be approved by the authorities.[110] In the years following the 1986 legislation minor adjustments in the regulation were made in line with the industrial uptake of contained genetic engineering, where the industry's arguments for a more relaxed regulation in order to enhance the competitive ability of Danish industry found some support in the revisions.

When in 1988 a Danish sugar factory and its seed division handed in an application to conduct field trials with GM herbicide resistant sugar beet, a review process and a parliamentary debate was instigated. However, no mention was made of the 'extraordinary circumstances' stated in the law, and permission was granted. So, although the deliberate release of GMOs was in principle banned, industry was not in practice prevented from undertaking R & D activities.[111]

After the EC issued directives on the contained use and deliberate release of GMOs in 1990, the Danish law was adapted accordingly, which meant that the ban on deliberate re-

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[110] Parallel to this, some debate was going on in regard to human biotechnology, which in 1987 led to the establishment of 'The Ethical Council', an advisory board established to monitor and debate the developments of new biotechnologies affecting humans. The Ethical Council has both professional members from the relevant scientific disciplines as well as 'lay' members, who are appointed in part by the Minister of Health, in part by Parliament. The Ethical Council has no regulatory competences, and serves a purely advisory function for the Parliament and the Government. This was later followed in 1992 by the establishment of an Animal Ethical Council', occupied with the ethical aspects of husbandry and the use of animals in research. Although the Council's standpoints have at times been controversial, there seems to be a general consensus that the Ethical Council is a good institutional locus for addressing the many dilemmas raised by new technologies in the human domain.

[111] An explanation of this apparent contradiction must be sought in the fact that Denmark throughout most of the 1980s was governed by various conservative-led minority governments, but the environmental legislation was mostly decided by a leftist 'alternative majority'. Hence, legislation was in the hands of the more environmentally concerned left wing of the Parliament, whereas the administration was in the hand of the more industry friendly centrist-right governments.

lease was abandoned and substituted with a general approval procedure. The procedure entailed that all releases (R & D and commercial) were assessed by the *Miljøstyrelsen* (the Danish environmental protection agency), the put through an open consultation procedure with the scientific community, industry and certain NGOs, and finally required approval by the Parliament (Toft 1996). Hence, the political system remained closely involved with approval procedures, which were not, at least in principle, delegated to administrative bodies, and stakeholders were allowed to comment on releases. Despite this formal political control, the assessments only evaluated the risks associated with release, and not its goals (i.e. whether the characteristics to be experimented with were desirable and beneficial). The procedure did, however, through its requirements of principled parliamentary approval, acknowledge that whether a given risk is acceptable is not only a scientific question, but also a political one. It has therefore been noted that "... this consultation system encourages open discussion on the more value-oriented considerations, which are recognised as part of the decision-making, rather than relegating them to an advisory committee." (Toft 1996: 172). After the EC directives had been implemented a relatively quiet period set in both in policy terms and in regard to public debate. As food products containing GMOs came closer to being marketed, a parliamentary debate in 1993 showed broad support for the principle that products based on genetically engineered processes should be clearly labelled, and a parliamentary decision in 1994 turned this attitude into national Danish policy and a policy goal to be worked towards within the EU. At that time most observers considered the regulatory questions around GMOs as settled,[112] and the activities of the major environmental organisations all but died out. In other words, it was expected that an established regulatory framework would gradually 'normalise' the surrounding society's perception and acceptance of biotechnology.

These policy developments were followed in the public sphere as well as among more specialised pulics, debating both regulatory principles and broader issues pertaining to the new biotechnologies.

According to Jelsøe et. al. (1998) the public debate – mapped via a survey of newspaper articles and letters to the editor in the period 1971-96 – exhibits both changes and continuities as well as variance in volume.[113]

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[112] For instance, Toft (1996) concludes that "(a)s the public and the politicians are well aware, the initial debate led to democratic influence over regulatory decisions. This democratic feature helps to explain the legitimacy of GMO releases in Denmark." (Toft 1996: 174).

[113] Recurrent issues are ethical issues related to new biotechnologies as well as continuing 'educational efforts' where newspapers run 'fact boxes' explaining the basics of molecular genetics and biotechnology. However, the educational efforts have declined somewhat. Jelsøe el. al. (1998) interprets this as a sign that newspapers assume a higher scientific literacy in this field among their readers than they did 25 years ago.

Jelsøe et. al. claim that the public debate during the period develops towards a clear confrontation between three argumentative positions:

- "technological optimists who requested extra Danish R&D efforts for the benefit of Danish science, industry and agriculture;
- technological optimists who saw possibilities for solutions for environmental and social problems in new 'sagacious' technologies; and
- critical experts who warned of environmental consequences as well as of trespassing ethical borderlines that might endanger social and political values" (ibid: 33).

The early phase of the debate was thus primarily defined by people who could claim scientific or technical expertise, even if not all held established institutional positions.[114]

The first law on genetic engineering in 1986 was described in the media as providing a stable environment for R & D activities, yet at the same time being strict enough to ensure public safety and acceptance through rigorous regulation and oversight. In the period following the first legislation, public debate and involvement turned more towards 'ordinary citizens'. One environmental movement in particular, NOAH, was quite active in distributing popular information about biotechnology and in mobilising against it.[115]

At this point in the story the Board of Technology, a parliamentary institution, began a public campaign. The Board sought both to inform the public and to instigate public debate and participation. One of the means of doing this was its first consensus conference, held on "Gene Technology in Agriculture and Industry" in 1987. Hence, relatively early there was an awareness in the policy arena and in the TA community that the emerging biotechnologies could raise socially sensitive issues and would require some kind of democratically informed guidance. The citizen panel's report from the conference was reviewed in the media and generally described as an expression of 'informed public opinion', although it took a quite concerned stance and stressed ethical and social aspects of the emerging technology.[116] In the early 1990s the reports on gene technology ceased to appear so frequently in the public sphere. Jelsoe et. al. take this as a sign that gene technology "...seemed to be accepted as a fact – perhaps deplorable, like so many other features of the world, but something that, in any case, was here to stay." (ibid: 34). However, when Dolly the cloned sheep arrived on the international media stage at more or less the same

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[114] A substantial part of the critical voices came from younger academics and science students.

[115] The mobilising strategy was primarily 'informative' rather than symbolic, assuming that if the public was aware of what was really at stake, they would reject these technologies. Therefore, demands for transparency and the 'right to know' has been a central part of NOAH's programme, which has made the organisation conceive of itself as both an environmental and a consumer organisation.

[116] Despite the early attention to potentially socially sensitive aspects of the new technologies, the output of the 1987 conference allegedly had little impact on the subsequent revisions of the legislation (Achen 1997).

time as the first commercial GM food products arrived on the European market, the debate was reopened with renewed energy.

The fact that Denmark was the first country in the world to enact a specific law regulating biotechnology was probably no coincidence. When comparing surveys of public debates and public opinion Denmark, stood out early as being one of the most critical populations of biotechnology in Europe. A number of factors contributed to this critical attitude.

Among these is the fact that Denmark had an active and well organised anti-nuclear movement in the 1970s. This movement had a quite high level of technical expertise, as it managed to mobilise academics with scientific training. It furthermore developed a status in the public as competent and reliable, and based much of its campaigning on information. Unlike, for instance, the German anti-nuclear campaign, the Danish campaign was based on information, the mobilisation of public opinion, and legal (if unconventional) political activities, not on legal litigation or paralegal direct actions.[117] When the debates about biotechnology took off in the late 1970s and early 1980s the 'battle' over nuclear energy had more or less been won by its opponents. Many of the members and supporters of the NGOs now turned their interest towards other environmental issues, amongst which the new biotechnologies began to be included. Therefore, much of the organisational resources, experiences and public credibility went into providing information on and debating biotechnology. The nuclear debates were also probably quite significant in exposing scientific uncertainties to the greater public. It became 'public wisdom' that cutting edge scientific knowledge is not monolithic and that institutional affiliation is likely to influence expert assessments.[118]

Furthermore, the nuclear debate had clearly shown that public mobilisation could influence policy making significantly – even in highly technical domains. Therefore, policy makers, scientists and industry had an interest in providing a regulatory framework, which could keep public resistance and controversy at a low level, but without impeding those activities considered essential for the industry. The passing of the world's first law on genetic engineering, which was rather strict, had a significant symbolic value. Industry representatives initially complained that regulation was overtly strict, but after the first public controversies over the contained use of GMOs they turned to a more open dialogue with stakeholders. Hence, in contrast to, say, German biotechnology companies, the Danish industry ex-

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[117] This can perhaps be explained by the fact that the Danish nuclear programme never reached a state of actual construction plans before it was abandoned, i.e. there was no 'need' for or possibility of physical blockades etc. However, it probably also reflects a less confrontational political culture and atmosphere at the time.

[118] This was of course experienced by most European publics since the 1960s. However, it can perhaps be argued that in the Danish consensus seeking culture this led to a broad recognition of a need for an open and inclusive public debate on scientific and technological issues earlier than in most other European countries.

pressed satisfaction with the first EU directive as they perceived it to allow their activities at the same time as facilitating public acceptance.

Up until the mid 1990s biotechnology issues in the non-human area were mostly debated in rather technical terms between scientists, technologists and industrialists in favour of applying the new technologies, and environmentalists and counter-experts sceptical about safety issues and the transparency of regulation. It should be noted that even if the constituencies of the environmental movements presumably had social and cultural reservations against biotechnology (of the kind described in Chapter I), the campaigns were almost exclusively centred around technical issues – perhaps because many of the active members were trained in the natural sciences, combined with the fact that the religious organisations (and forms of arguments) in Denmark have been practically absent from the biotechnology policy arena. The regulation aimed to prevent risks, not to set broader social goals for the technology (beyond enabling a Danish share in the economic growth believed to accompany the application of these technologies). Hence the institutional opportunity structure favoured a 'technical' mode of argumentation, from which 'ethics' and social benefits were virtually absent as explicit modes of argumentation.

These differing views on the technology were primarily mediated in the political system (rather than in the mass media, the legal system or in the market, as few actual products emerged). The Danish political system chose the course of balancing regulatory and promotional policies and at the same time attempting to accommodate public concerns. This is evident in the fact that, as the first law on genetic engineering was followed by a biotechnological research programme, the Danish Board of Technology was provided with the means to undertake technology assessments and initiate a qualified public debate. There were some surveys about the population's attitudes towards the new biotechnologies that showed a rather sceptical mood, but as most of the technologies were still in the R & D stages, this did not attract much concern among the protagonists of the technologies, who likely expected that public scepticism would decline with increased popular knowledge and practical experience with actual products. However, exactly the opposite happened.

Re-emergence of Controversy around Commercialised Biotechnology

In 1995 Monsanto applied for approval of a herbicide-tolerant soy bean ('RoundUp Ready') for human and livestock consumption in the EU.[119] This approval was granted by the EU commission in the spring of 1996, after an expert committee had judged it safe for

[119] The GM soy was not, in the first instance, to be grown within the EU, but imported primarily from North America.

human consumption on the basis of the 'substantial equivalence' principle.[120] However, as the then ongoing work on a Novel Food Directive was not yet completed, labelling requirements and safety approval of food containing GM ingredients were still within the competence of national authorities (Lassen et. al. 2002: 280).[121] Hence, when Monsanto sought and received approvals to market the GM soy in the EU,[122] it became clear to the political system in Denmark that the 1994 principled decision by Parliament that all GM food should be labelled had not been operationalised in the regulation. The authorities were not prepared for this situation – they had expected a pending EU directive on Novel Food to deal with most of the practical questions regarding labelling – and were somewhat irresolute about what to do. Hence, they requested political guidelines. This led to several debates in the Parliament in the autumn of 1996 about how the labelling requirements should be made practicable, which also touched upon more principled issues regarding the purposes of labelling. It also re-activated the NGO community, which saw both new avenues to further their standpoints in the public arena (as the issues in food seemed 'nearer' to many people than R & D releases), and as new actors and framings emerged in the arena.

Importantly, these debates in the political system occurred at the same time as the first shipments of GM soy from America arrived in Europe. Therefore, although the Danish food safety authorities had declared the soy safe for human consumption, the political system was seen as being reactive rather than pro-active in the field, and the responsible minister made several policy changes due to political pressures (ibid).

Both Danish environmental and consumer organisations and the Danish media got hold of the information that a shipment containing 2% GM soy mixed with conventional crops for use in processed food was on its way to the country to be used in the Danish food industry. The fact that the shipments were on their way, with a cargo that was both controversial and, in the eyes of some observes, not safe for human consumption while the political system were still debating how to handle the crops proved a strong symbolic image. This was used by the environmental organisations to claim the alleged impotence of the political system while reiterating concerns that the approval procedures were not thorough enough to establish if the food was really safe. This re-opening of the controversy over GM crops had several discursive dimensions, which were to unfold both in the political system and the mass media in the months and years to come.

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[120] This assessment principle, which has been quite controversial, assumes that if a GM crops is 'substantially equivalent' in biochemical and physio-sanitary terms to its conventional counterpart then is it safe to eat. This means that approval procedures are based on biochemical property analysis, not the actual testing of nutritional effects through, for example, animal experiments.

[121] The Directive on Novel Food was passed in late January 1997. However, in the meantime national policies were possible (Lassen et. al 2002).

[122] The RoundUp Ready soy was also approved as safe for human consumption by *Levnedsmiddelstyrelsen*, the Danish food authorities, as part of the community wide assessment procedure (Lassen et. al. 2002).

First, there was the perception among activists and in certain media reports that Monsanto had mixed the GM soy-beans with conventional ones with the deliberate intention of making them unavoidable and difficult to trace, thereby making effective labelling impossible.[123] Among GM sceptics this fuelled the argumentation that the technology would only benefit large multinational corporations, which were virtually impossible to hold accountable. This marked the uptake in the Danish debate on biotechnology of issues that were neither of a 'technical' nature (i.e. whether the crops and products are 'risky' in a well defined, measurable sense), nor regarding what can be considered as'(bio)ethical', i.e. having to do with the integrity of nature or animal welfare. Instead, they were concerned with the motives and driving forces behind the technological trajectory, and were to expand rapidly in the years to come.[124]

On the environmental side, discussions were also influenced by the fact that in the years leading up to these events, residues from the herbicide RoundUp, which was claimed to be relatively benign as it was supposed to break down in the soil, ware found in Danish ground water resources, which have traditionally been used without purification. The discovery of herbicide residues in the ground water was looked upon as quite serious and has since been used in arguments both for and against GM crops, depending on whether the use of herbicides are claimed to increase or decrease as the result of the application of GM crops.

Furthermore, the questions on both the technical and legal character of labelling tapped into a relatively strong discourse on 'political consumption' in Denmark at the time, where, for example, boycotts of Shell after the Brent Spar affair, and of French food in general and wine in particular following the French nuclear tests in the Pacific, had fuelled the idea that political statements could be expressed through consumption, which some environmental and consumer organisations also wanted to pursue in regard to GM food (Lassen et al. 2002: 290). As reliable labelling is essential for consumers to identify desired or undesired commodity traits, this became a key issue in the public acceptance discussions. For the GM sceptics it became a standard argument that people should have a right to choose whether they wanted to consume GM food or not. At the same time 'moderate' GM protagonists acknowledged that consumer trust depended critically on transparency and information – basically, that GM food could not survive a widespread suspicion that something was being kept secret. The principle of consumers being allowed an informed choice was widely recognized among the political parties in Parliament, as it proved to be a regulatory mechanism that sat well with otherwise diverging political framings of the technology.

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[123] Monsanto argued at the time that it would not be practically possible to keep GM and non-GM crops separate all the way through the production chain, something which in the light of the continuing European hesitation has subsequently been established.

[124] Of course these issues had not been completely absent in Danish debates before 1996, but became significantly attenuated in this phase.

Opinion polls at the time showed a significant majority of the population to be opposed to GM food in general, and a strong desire to have their presence indicated in labelling (Lassen et. al. 2002). Given that a significant majority of the members of Parliament belonged to parties with a cautious but basically positive attitude towards biotechnology, this led to some attention to the fact that the political system seemed to be out of touch with their constituencies. For some of the GM sceptics the continuing public scepticism became an argument in itself against allowing GM food as they could successfully use framings of elite insensitivity to the will of the citizens and 'common sense'. Environmental organisations in particular began to use not only technical or scientific arguments, but also 'democratic' ones, i.e. that GM crops were 'being stuffed down our throats against our will'.

Around the time when GM food reappeared on the public and political agenda with renewed intensity, Denmark also witnessed a 'radicalisation' in the activities of environmental and consumer organisations, as well as a change consisting in a gradual shift from informative to symbolic campaign formats. Whereas NGO activities had so far consisted mostly in the dissemination of information, the stimulation of the public debate and lobbying in the policy arena, new actors now emerged in the arena and new action forms were introduced. Most notable is that Greenpeace International put GMOs on their agenda, both in regard to human health and environmental effects at this time. Therefore, the theme was also taken up by the Danish branch, which has since been one of the most important NGO actors operating in this domain. However, other minor organisations also emerged around the topic and some existing organisations put it on their agenda (Jamison and Lassen 2004), and some of these worked with more unconventional methods.[125]

In effect, a new wave of public attention to and concern over agricultural biotechnology took off with the commercial introduction of GM based food products. This renewed attention and concern remained on the public agenda for quite some time and entailed a number of topics and problem framings. Initially, in this new wave the focus was primarily on the safety of GM food for human consumption, as well as how this could be ensured. Later environmental concerns moved to the centre of attention. However, these discourses were increasingly mixed with debates about the ethical and socio-economic features of the new technologies.

The announcement of the birth of Dolly, the cloned sheep, in February 1997 further intensified debate over the ethical perspectives of the new biotechnologies, which also 'spilled into' the use of plant genetics. Other issues and scandals in the European food sector, no-

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[125] This 'radicalisation' can be seen for instance in the fact that when the first shipments of GM soy arrived in Århus harbour in December 1996, activists blocked the unloading for several days, literally while the Parliament was debating the labelling regime. The simultaneity of the two events obviously attracted a lot of media attention to the issues, which remained in the following months (Lassen et. al. 2002). Other examples of these new forms of political action were incidents where environmental and consumer organisations did their own 'labelling' of products that contained GM ingredients by putting stickers on products in supermarkets, as well as a single incident of an attempted sabotage of a field trial of GM crops by a Danish company.

tably the BSE affair, also impinged on the public debate on whether approval and control procedures were sufficient and reliable, and whether the further intensification of agricultural production was desirable and justifiable, also trickled into the Danish debate. It was against the background of this apparent resurgence of a very lively public debate that the political system launched the different initiatives to be discussed in the following.

Public Participation in the Danish Context

Initially in this chapter, I stated that Danish science and technology policy-making is and has been relatively open to public inputs. This is manifested in two principle manners. The policy making process is relatively transparent and accessible to various social interest groups. Furthermore, Denmark has a particular tradition for 'peoples' enlightenment' dating back to the mid 19th century, where adult educational institutions were established – especially in rural areas. The essence of this tradition is to educate people to participate in the political life of their municipality and the country through a high level of general education and a culture of open debate. The tradition has been carried on in the present day. The general population is relatively well educated,[126] and to a political culture of public debate and the idea that 'ordinary citizens' are generally competent to participate in complex political choices, including where technical matter reigns. This meant that when technological optimism was gradually mixed with and replaced by concerns about the side effects of technical modernity, as promoted by a growing environmental awareness due to the emerging environmental movement, technocratic solutions were tempered by public debate about means and ends, and significant citizens' involvement on the level of local administrations. It can thus be argued that whilst in other European countries public involvement has been initiated as a solution to various legitimacy and efficacy problems observed by the political and innovation systems in Denmark such developments emerged more spontaneously from the existing political culture.[127]

As a prerequisite for maintaining an informed and engaged citizenry, the state has provided funding for a number of activities meant to stimulate debate on various issues. In the 1970s when nuclear energy was debated, public funding was provided not only for publicly run information campaigns, but also for the information campaigns of NGOs such as labour unions, co-operatives and environmental organisations. This was continued with regard to the emerging biotechnologies in the 1980s.

Parallel to the 'self-organised' (but often state supported) information campaigns on nuclear energy and biotechnology – as well as other issues – a particular institution, The Dan-

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[126] Danes score relatively high on the Eurobarometer measurements on scientific literacy on biotechnology (Jelsøe et al. 2001: 166).

[127] Which is probably why Denmark has in the international discussions, been considered a pioneer in combining involvement of the citizenry with a relatively innovative and competitive business environment, i.e. citizen involvement has not been seen to stifle technological dynamics in the long run (Cronberg 1996).

ish Board of Technology (DBT), was established by the Danish Parliament in 1985. The Board was conceived to bridge a perceived gap between experts, politicians and the public, and arguably the establishment of the Board was an attempt from (parts of) the parliamentarian system to give an institutional focus and channel to the grass root activities that had emerged in the 15-20 years preceding to its establishment. The DBT was clearly inspired by the US Office of Technology Assessment, but was given a particular Danish character (Klüver 1995: 41). As such, the Board consciously sees itself as contributing to the particular Danish tradition of 'peoples enlightenment'. For instance, the DBT from the outset took a less expert-based approach to technology assessment than most other TA institutions at the time, meaning that

> *"...the understanding of technology assessment gradually shifted from an 'objective' assessment system in which only the directly involved parties take part, to a 'social' system in which the assessments of as broad a spectrum of interested parties as possible are juxtaposed, and common assessment is sought. At the centre of such assessment was no longer merely technology itself, but the complex interaction between technological development and societal needs."* (Joss 1998: 7, see also Cronberg 1996)

As an organisation, the DBT has hence sought to serve a dual function in the Danish public and political landscape, on the one hand stimulating broad public debate and knowledge uptake about technological issues, and on the other delivering expert recommendations to the Parliament and the Government on present and prospective technological issues as well as functioning as one the political systems 'sensory organs' on public concerns.[128] According to its director it does so by intervening and mediating in selected topics fields to pursue one or more of three functions: the creation of new knowledge (be it of a scientific, economic or social nature), to pursue normative clarification in controversial areas or to suggest practical solutions to a given problem. Problems chosen for the attention of a DBT intervention must have an element of technology, but cannot be purely 'technical' in nature. There is no particular constituency for whom these problems must exist, although they typically involve the interest and attention of the political system as an addressee of recommendations.[129, 130]

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[128] Organisationally, the Board consists of three elements. An approx. 50 person council with members appointed by a wide range of public institutions (ministries, agencies, research councils) and private organisations (labour unions, employers organisations, professional communities, NGOs etc.), which serves as a forum for debate on the activities of the Board and as a vehicle for the concerns of various social interests to find their way into the work of the Board. Second, it has a board of governors of 10 members also appointed by various social interests, which oversees the work of the Board's secretariat and decides on the thematic activities of the Board. Finally, there is the secretariat, which is the executive branch of the Board, with around 10 professionals to undertake the activities of the DBT. It has no in-house technical expertise, but engages expertise from research institutions, consultancies and stakeholders.

The annual budget of the DBT is approx. 10 million Dkr, or 1,3 million Euro. The Board is politically independent of the Government and reports to the parliamentary research sub-committee.

[129] Interview with L. Klüver 13.01.2004.

The Consensus Conference Format

Since its creation the Danish Board of Technology has been developing and experimenting with a variety of methods to foster public involvement with technology. Common to these methods, in the words of the Boards' director, is the ambition to embrace:

- "the wisdom, experience and visions of citizens
- the insights and tools of experts
- the needs and working conditions of decision makers
- the democratic traditions in Denmark." (Klüver 1995: 41).

Judging from the literature on public involvement with technology, the method that has received the most attention is clearly the *consensus conference*, which is often discussed as an exemplary mechanism for facilitating both an uptake of public concerns in the political system and the stimulation of public debate. Because of this prominence in the debates, the consensus conferences format is interesting both in its own right, and also, in my opinion, for discussing more general issues regarding procedures of public participation and deliberation. Therefore, I shall explain the format in some detail the following by looking at how the DBT frames the methodology, how the conferences are organised practically and how they can be interpreted using some of the theoretical concepts discussed in this thesis. Subsequently, I shall then look at the organisation, output and effects of a particular conference, using this as a starting point for a discussion of some of the challenges related to such procedures.

Consensus conferences belong to what the DBT call 'participatory methods':

> *"We apply the word participatory to methods involving people from outside the relevant expert circles, in order to give the process an assessor who has credibility in the eyes of the relevant decision makers. Participatory assessments thus take place at the interface between expert and non-expert, with experts giving input, non-experts making the assessment and decision makers using them."* (Klüver 1995: 42)

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[130] Despite a significant international interest in the work and methods of the DBT, one can detect a rise and decline of the DBT in regard to the Danish political system. It was established on a probationary basis in 1985 by a left-of-centre parliamentarian majority in opposition to the then governing right-of-centre coalition government. This government considered the envisioned technology assessment as hostile to technological innovation and the business environment. However, the activities of the board gradually won the approval of most political parties, and in 1995 the institution was made permanent under a social democratic government with broad parliamentarian support. By then allegedly most parliamentarians occupied with science and technology were supportive of the DBT as an institution (Joss 1998). However, with the shift to a rightist government in 2001, who cut public spending and political dependency on all sorts of advisory committees and councils (and a perceived 'expert-dominance' of policy formation), the DBT had to fight for its existence and had approximately a third of its budget cut. It was, however, saved by parliamentarian pressure on the Government – possibly with the reference to the international standing of the Board. One explanation of this suggested to me is that some parliamentarians use the Board as a sort of 'counter expertise' to confront experts from the various government departments (Interview S. Gram, 21.01.2004).

The particular trademark of the consensus conference format is the central position reserved for a panel of laypeople, which serves a direct and autonomous advisory function for the political system. The primary task of the lay panel is to articulate the concerns and wishes of 'ordinary people' in front of decision makers. They do not do this, however, as a simple expression of public opinion. The decisive element here is the dialogue with experts, which allegedly turns this into 'informed public opinion', i.e. what the general public *would* think of a given topic, *if* it was appropriately enlightened. The assumption (or hope) is that the evaluations and the recommendations of the lay panel will then flow into the debates and decision making of the parliamentary system.

The consensus conference format is also equipped with a number of other, secondary functions. In line with the dual institutional aim of the DBT it is hoped that consensus conferences will have an effect on broader public debates as agenda-setting events and through media attention to the process and outcomes (ibid: 44). Furthermore, it is stressed that consensus conferences – in addition to the direct outputs and the possible instigation of or contribution to public debate – also serve to demonstrate that ordinary people are capable of dealing competently with complicated issues. As such, consensus conferences are informed by an anti-technocratic ideology and aim to strengthen a democratic ideology that people are in general competent to rule themselves. In my interview the director also stressed that consensus conferences often have also had the effect of intervening in discussions in expert communities by forcing them to perform these in front of a lay audience. Allegedly, in this way epistemic communities of experts can learn from dialogical confrontation with ordinary people and be brought to contextualise their knowledge in manners that would not otherwise happen.

In practical terms the consensus conferences are organised in the following way. When the DBT decides to work with a topic for which a consensus conference is considered a suitable methodology, the board puts together a steering committee of 5 to 10 people to oversee the preparation of a conference, which takes six months to one year. In addition to a project coordinator from the DBT, these are representatives of various stakeholders with knowledge of the conference topic. They ensure that all important topics are covered in a balanced manner and that appropriate experts are short-listed. Some time before the conference commences, the Board contacts a number of citizens from a random, representative sample and asks if they would be interested in participating. From the positive responses the Board selects a panel of around 15 people to make up the laypersons' panel. A panel of this size evidently cannot be representative in any statistical sense of the Danish population but facilitates the dialogical form of interaction. However, in the compilation of the panel the Board strives for coverage of a broad spectrum of socio-economic traits in terms of age, gender, level of education as well as geographical dispersion. The lay panel,

which must consist of people without 'interests' in the topic,[131] are brought to 'well-above-average-knowledge' on the theme to be analysed through a couple of weekend training sessions, typically given by academics. They are then asked to make up a list of issues and questions they would like to address to the expert panel. On the basis of these questions, the expert panel is then compiled by the steering group. This typically entails some negotiation among the stakeholders on the steering committee about who the suitable candidates are, as it is assumed that the composition of the expert panel has some influence on the conclusions the conference will reach. According to the director the expert-role is conceived quite broadly, spanning from very 'cognitive' competences where academics are typically invited, to knowledge of quite 'political' issues where 'expertise' does not consist in scientific merits or knowledge, but other insights into the issues are sought. In very controversial and clearly polarised cases, like the GMO issue, balance in terms of pro and contra views is usually considered before scientific credentials.

The actual conference typically runs over three days. The first day the expert panel give presentations on scientific, technological, legal, economic, social and ethical aspects of the technology under consideration on the basis of the questions asked by the lay panel. The presentations are supposed to convey state-of-the-art knowledge, but also reflect expert disagreement and current controversies in professional communities and among stakeholders. The second day is devoted to discussion between the experts and lay panel and among the lay panel themselves. After that, the lay panel produces its final document with assessments and recommendations, which on the third day is presented to the participating experts, the public and interested parliamentarians.[132] As indicated in the name of the format, the panel is encouraged to reach consensus on as many issues as possible, but this is not a demand.[133] Hence, it is not unusual that minority statements are mentioned on certain topics where the panel has not reached a consensus.

The director of the DBT accentuates four aspects of consensus conferences as a democratic mechanism, which make them relevant to policy makers:

1. They often provide specific recommendations, which can inform decision makers of the citizenry's view on the need for regulation of a given area.

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[131] The panel is of course interested, but panelists may have no immediate involvement with the issues to be debated, i.e. they cannot themselves or their family work in the industries concerned, be active in grass root movements or the like.

[132] The experts are allowed to correct factual misunderstandings, but apart from that the document is passed unchanged on to the Parliament and the media.

[133] The director explains it as an attempt to see – given that the panel is sought compiled of people from quite different backgrounds – how far the panel will 'go together' and when it starts 'hurting' and some of the participants no longer want to endorse of the common statement (Interview, L. Klüver).

2. They express an 'ethics in practice' as they are a democratic formulation and expression of attitudes towards specific technologies.
3. They are non-technocratic as the assessments put forward can be seen as a manifestation of widely shared ideas and values from a non-partisan lay panel.
4. They have an inherent political appeal. As the lay panel does not have any 'interests' in the topic (as a number of other advisory channels do) the results appear as the product of a dialogue, not compromises between conflicting interests or the application of non-discursive resources. Klüver hence labels consensus conferences an 'ideal mini-democracy'. (Klüver 1995: 45).

As should be evident from this description, consensus conferences can indeed be viewed as bodies in which 'the public' is operationalised in a specific manner in order to facilitate the uptake of public concerns in policy making. As this issue is central to the thesis it seems worth trying to explain a little further what the underlying assumptions behind this particular operationalisation are. This should also serve to sharpen the observation to be made on the specific conference I then analyse.

A notable feature of the conferences is that although the output from the conferences aims to inform the political system about how ordinary people view and assess certain technological developments and options, they do not aim or pretend to be representative of the population at large. The fact that the participants can in no way be representative in the statistical sense, which is often considered an essential presupposition for a political mechanism to be considered 'democratic', is compensated for in two ways. The first is to strive for inputs that are cognitively *qualified,* the second is seek inclusion of a broad *spectrum of values.*

One assumption underlying the conference model is thus that a certain level of factual and cognitive knowledge is an advantage for taking a standpoint on a given issue, but that such a learning process does not change people's basic values (Klüver 1995: 45). It is assumed that people have some basic values that are not altered by additional cognitive knowledge. Consensus conferences do not aim at *normative* learning among the participants (i.e. that they should change their viewpoints), but at confronting technological dynamics with basic values. However, it is assumed that increased knowledge and mutual dialogue can have a 'civilising' effect: "Additional knowledge may allow you to understand the motives and attitudes of other people, and as a result you may add nuances to your opinion" (ibid). This is why participatory and deliberative procedures are hoped to mitigate or domesticate technological controversies (whereas consensus conferences are less fit to serve public educational purposes).

When viewed from the perspective of sociological theory it seems that the conferences' inspiration can be traced back to two – partly contradictory – models of social rationality. On the one hand there is, as in much of the normative and organisational discussions on

public participation, a clear inspiration from a Habermasian ideal of communicative rationality, namely that it is possible and desirable for social collectives to test different validity claims against each other and arrive at common, agreed viewpoints of a cognitive, normative and expressive character. This is the consensus aspect of the conferences. On the other hand, an assumption also seems to be made that values are deeply rooted in people, and are immune to discursive argumentation but related to the individuals' location in the social structure. Therefore, numerical representativity, which cannot be achieved due to the size and nature of the procedure, is replaced by the wish to span as broad a *spectrum of values* of relevance to the issue as possible. Practically this is done by assuming that values are systematically related to the social structure, which is why the organisers seek the lay panellist among people with very different characteristics and life experiences in regard to gender, age, socio-economic status and geographical dispersion. These assumptions are well in line with the cultural theoretical paradigm discussed in Chapter III. Abstractly speaking the consensus conference format can then be seen as an attempt to facilitate an articulation of a plurality of (perhaps incommensurable) values present in modern societies and the necessity of seeking a common ground on which to collectively regulate technologies.

As discussed in Chapter III, processes of public involvement can be seen as ways to absorb protest potential among those affected by technological choices. When viewed with this purpose in mind the number of people that actually partake in the conferences makes it obvious that in order to fulfil that function, the ability not only to be organised according to competent and fair principles *internally* (Renn et al. 1995), but also to influence policy making *beyond* the procedures themselves is a critical issue. This is a topic I shall have more to say about later on. For an immediate consideration it can be noted that the investigations indicated that consensus conferences as a method has found broad acceptance in the political system in Denmark, where politicians allegedly find the inputs from ordinary people a stimulating alternative to other advisory sources (see Joss 1998 for interview quotes from parliamentarians).

Some of the issues introduced in this section will be elaborated in the analysis of a specific conference from 1999. However, before moving on to that I shall discuss an initiative also intended to address concerns circulating in the public sphere. This initiative framed the controversies as being of a particularly *ethical* nature.

The BioTIK Commission

Following the renewed controversy over GM crops and food after 1996, the agricultural and food industry in Denmark considered not only the climate among consumers but also the *political* conditions as too uncertain to make robust choices about biotechnology. The business sector organisations therefore requested clarification and guidelines from the po-

litical system. This was the immediate reason for the establishment of the BioTIK commission[134] in the autumn of 1997 by the Ministry of Trade and Industry.

The ministry put together a temporary expert group and commissioned them to produce an introductory presentation, which could "*set the scene for a nuanced debate on bio- and gene technology and create a broader understanding of the population's attitudes towards new technology*" (BioTIK 1999: 15).

As the quote indicates, the re-emerged controversy initiated by the commercialisation of agricultural biotechnology had clearly left both producers and the political systems somewhat baffled about the concerns expressed in the public and the roots of the controversies.

In matters like these the Danish political institutions understand themselves as operating within a culture of open dialogue, transparency and the consensual or compromising accommodation of interests. This understanding is reiterated as the motive behind the BioTIK initiative.[135] However, the 'interests' were not particularly clear, nor well articulated. They seemed be characterized by some vague uneasiness with these new, and to many people undesirable technologies. The dominant interpretation of such uneasiness at the time, the deficit model, obviously did not apply, as the Danish population were, according to surveys, among the most knowledgeable in Europe but also among the most sceptical. Hence, it was assumed that public uneasiness was not something, which could be settled through educational efforts (alone). From this situation, it seems, springs the dual task of the initiative to stimulate a 'nuanced debate' and to investigate the motives behind the 'population's attitudes'. One could argue that these tasks do not seem obvious candidates to be addressed in one and the same process. At least from a social scientific perspective, structuring and stimulating a debate is not naturally complementary to investigating the factors and mechanisms underlying the formation of attitudes. However, the 'ethics' framing underpinning the initiative may render this dual task more intelligible. In the report it is argued that all technologies pose ethical issues, but that this is particularly so for biotechnology because it is based on manipulating living material (ibid: 10). At the same time it is assumed that much of the scepticism towards these new technologies is of an 'ethical' nature and can only be settled on the basis of normative clarification. Hence, the need for ethics is framed as both 'intrinsic' to the contested technologies and 'extrinsic', since it is a precondition for popular acceptance of a technology in which great expectations were invested.

In this investigation I have not attempted to clarify how or where this ethical framing emerged. It is, however, clearly part of a larger discursive trend emphasising 'ethics', which applied to biotechnology in a number of national contexts around that time (e.g. Wynne

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[134] The name is a contraction in Danish of *biotechnology* and *ethics*.

[135] It is for instance argued that: "The insecurity [of the population] cannot be managed by suppressing or denying it. Openness and dialogue is required. And it is necessary that decisions about using gene technology are based on a nuanced discussion of options and risks, where all viewpoints have the possibility to be articulated" (BioTIK 1999: 9).

2001a, 2001b), and what can perhaps best be described as a *Zeitgeist* giving 'ethical' discourses a certain trenchancy across a number of social contexts, at least in Denmark, in this period (ethical accounting in business and so forth).[136] Instead of delving into the genealogical roots of this choice of an ethical master frame, I shall take a closer look at how the ethical framing was specified and what effects the work of the BioTIK commission had.[137]

The location of the BioTIK initiative within the Ministry for Trade and Industry was partly a consequence of the immediate demand for the process from the food industry. However, according to my interviewees it must also be attributed to the fact that the permanent secretary in this department took a particular interest in the topic, which other government departments were rather reluctant to deal with. This permanent secretary was keen on introducing an explicit ethical framework in the regulation of biotechnology, something that had consisted only in very implicit considerations in the dealings with non-human biotechnology in Denmark up to this point (Achen 1997).

The fact that the explicit considerations of ethical issues was a new way of approaching the popular acceptance of biotechnology made the initiation of the BioTIK work quite controversial within the political system, in regard both to its composition and terms of reference.[138]

According to my interviewee who sat on the committee, the work was conflict-ridden. This tension was the result of an allegedly unspecific reference for the committee's work, combined with the fact that the members of the committee had very different perspectives on what the issues concerning biotechnology really were.

After about a year and a half the committee's work resulted in a 140 page report, which, arguably, is not entirely coherent. Nonetheless, most of its conclusions and recommendations were subsequently adapted almost word for word in a policy statement issued by the Government and debated in the Parliament a year later. As the report and the subsequent policy statement is one of the most systematic and explicit ways the Danish political system has dealt with public concerns over biotechnology, I shall explain some of the frames in it.

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[136] At the time of writing (November 2004) another topic, functional food, that is food with technologically enhanced nutritional characteristics is being intensely debated in the Danish public and both politicians and industry representatives have reiterated the need for an 'ethical' debate with the population in order to avoid risks in investing in innovations for which there is no market. Here, however, it seems that 'ethics' are a residual category into which the kind of concerns that cannot be otherwise accounted for (e.g. physical risks) are placed.

[137] In addition to the BioTIK report, a number of issuing policy documents and transcripts of parliamentary debates, the following description is based on interviews with one committee member, professor of bioethics Peter Sandøe, The Royal Agricultural and Veterinary University of Denmark (Interviewed 14.01.2004), consultant and former NOAH activitst Jesper Toft, who was engaged to do documentation work for the committee (Interviewed 19.01.2004). Further details were elicited from civil servant Mette Gjerskov from the subsequently established BioTIK secretariat (see below) (Interviewed 16.01.2004).

[138] Allegedly the composition of the committee was changed several times in negotiations between different government departments and consulted organisations in order to find a composition that could satisfy everybody (Interview, Sandøe).

The report deals with the following issues: what concerns lay people hold about the new biotechnologies; what the mechanisms underlying genetics are; what can potentially be done through genetic manipulation; what the hopes and concerns (among professionals) are in regard to both medial and agricultural/industrial applications; how different types of ethical reflections can be brought to bear on these issues. On this background, the report suggests some criteria to be applied in the regulation of biotechnology and discusses different ways of doing this.[139]

This section of the report aimed at improving the understanding of public concerns and opinions and explicitly draws on some of the literature reviewed in Chapter I. It discusses the work of Beck and Giddens to situate the concerns in the context of modern societies and the EuroBarometer studies as well as Wynne's more qualitative work on the interaction between lay people and experts.

The general conclusion drawn is that a successful application of the potentials of the new biotechnologies presupposes not only an adequate level of protection against risks, but also that the political character of risk assessment and management is recognised and that people in general trust in the experts they are unavoidably dependent on. Such trust can only emerge if the concerns of the public are taken seriously and dealt with openly. "It is only through openness and dialogue that the impasse of uncertainty and anxiety can be broken" (p. 23). Hence, risk politics is here presented as requiring 'dialogue', and the report sees self-organised social movements as an important vehicle for such a dialogue between those who make decisions about applying new technologies (industry), those regulating it (politicians) and 'the public' (p. 29).

A certain rhetorical tension can be seen in the fact that the report presents itself as being in line with a broadly participatory or consensual Danish political culture, which it, as it argues through references to selected sociological literature, should be strengthened to deal with the challenges the advent of a risk society. This means that all should be allowed to articulate their concerns. Yet one requirement for this according to the report, is the existence of a 'common language', in which political visions and societal values can be formulated and debated (p. 30). Though this is only hinted at, parts of the report seems to suggest that such a common language can be found (only) in the formulation of generally agreed ethical principles, which the report articulates in an authoritative fashion.[140] As such the report in a

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[139] The report was meant to stimulate a 'debate' on the ethics of biotechnology, hence the 'technical' chapters are not of interest here, although it does contain interesting issues about how biotechnology was framed from a regulatory point of view. For instance when the possible coexistence and compatibility of GM crops and organic farming are touched upon. Here organic farming is referred to as a 'way of thinking' (p. 92) whereas genetic engineering is framed solely as a technology, as a means. Hence, organic framing is given a 'cultural' framing, which genetic engineering and conventional agriculture is not. Organic farming is seen as more value based, whereas the productivist paradigm is not seen as a cultural product at all.

[140] It is stated that dialogue must be based on some broadly accepted values and ground rules (p. 10). A set of such values, claimed to mirror the values underlying the Danish welfare society, are explicated and suggested

sense predefines the kind of rationality public debates must be based on. The need for 'ethics' as a necessary platform for common debate is linked to sociological studies suggesting that the concerns of the public are primarily about *trust* (which is not defined further). It is argued that trust only comes about if a social dialogue using a shared language can be established, and the report defines such a language as 'ethics'. In effect, the willingness of both policy makers, technologists and the public to adapt an 'ethical' stance on biotechnology is framed as a prerequisite for reaping all the potential benefits of biotechnology in a socially acceptable manner and the remainder of the report sets out to define what this 'ethics' is.

The discursive framing of public concerns as fundamentally *ethical* is reiterated throughout the report. However, the report claims that if ethical considerations are to be useful in the regulation of biotechnology, 'bioethics' must dispense with the traditional divisions between 'ethics of duty' and 'ethics of consequence', as neither can fully address the challenges raised by modern biotechnology. Instead three other ethical approaches are introduced, which are claimed not to be mutually exclusive, but complementary; utilitarianism, the ethics of integrity (of humans, living beings and nature) and discourse ethics. None of these can, according to the report, be dispensed with if ethics is to deliver adequate guidelines for the social regulation of biotechnology, but it is not explained how they relate to each other.[141] The report acknowledges that politics, legislation and regulation in modern societies must make considerations other than ethical ones. It does suggest, however, that ethically based guidelines may be useful in shaping regulation to fit better with public concerns over new technologies.

Ethical considerations serve two purposes in regard to biotechnology; they indicate what are reasonable and ethically defendable applications of the technology and set limits on applications, i.e. they serve both *guiding* and *restricting* functions. These requirements are realised as a number of general principles, gathered under five headings, namely that gene technology must be developed and applied:

- to the benefit of the human being, society and living nature
- respecting the autonomy and dignity of the human being
- respecting the integrity of life
- respecting the vulnerability of life

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guiding future dialogue on the issues. Hence, the report frames itself as mirroring shared values and at the same time strives to explicate and enforce these in regard to biotechnology governance, i.e. the report (implicitly) argues that although widely shared in Danish society, it cannot be taken for granted that such values will automatically influence the regulation of biotechnology if they are not articulated.

[141] A cynical observer might suggest that the report could not dispose of them if all the philosophers and social scientists on the committee were to have 'their' approaches included and that the argument is as much a product of the composition of the committee as of the topic it dealt with.

- to promote justice (reasonableness) in the distribution between human beings of benefits and burdens (respectively food and acceptable risks)
- respecting individual societies' right of self determination and freedom of choice, in decisions reflecting the concerns and wishes of the population

Here the report clearly holds the moral high ground, as these principles can hardly be argued against in the abstract. However, nor are they particularly operational, of which the report is aware. Therefore they are boiled down to four thematic clusters from which ethical 'check lists' are formulated for different areas of application (humans, animals, plants, democratic procedures) and different social contexts (regulation, research and development, public debate). The thematic clusters are:

- Economic and qualitative benefit
- Autonomy, dignity, integrity and vulnerability
- Just distribution
- Participation and openness

In its conclusion the report discusses various ways in which these principles and checklists can be incorporated in regulatory activities, research and development and public debate and makes a number of recommendations.

Uptake of 'Ethics' by the Political System

The BioTIK report subsequently formed the basis for a policy statement paper by the Government on 'Ethics and Gene Technology' (Regeringen 2000), which was presented by the Minister of Trade and Industry and debated in parliament in April 2000 (Folketinget 2000). A notable feature is that although the original report was labelled as stimulus for a broad public debate, the statement paper mirrored the report quite closely, and the four ethical 'principles' listed above were reiterated as the basic ethical principles that should underlie Danish policy on gene technology. Furthermore, the Government turned some of the proposals from the report into policy goals, namely to create an Internet site to disseminate information and create a forum for debate,[142] to develop new methods to stimulate debate between experts and lay people and to establish an inter-departmental task force to ensure implementation of ethics in all relevant legislation. The statement recognises that the central political challenge is to influence the international regulation of gene technology. It is claimed that in regard to GM crops and food the options for Denmark to apply ethical criteria on its own are rather limited, as this area is regulated through EU directives

[142] The idea for this was taken from a similar initiative in the UK, which may be taken as one illustration of a significant international exchange of experience and mutual observation between different policy contexts.

and to some extent WTO regulations. Hence, the suggested policy is to work for the incorporation of ethical principles in as many international forums as possible.

The subsequent parliamentary debate was marked by the almost complete absence of a substantive discussion of the ethical criteria. Apparently they were readily accepted as an expression of *the* relevant ethics, not as the working compromise of a committee. As such, ethics became a 'black-boxed' resource that political communication could draw on to pursue different (party political) agendas, and not a matter to be contested in itself. In effect, the political system took the presented ethical principles as an opportunity to discuss political disagreements regarding biotechnology, not to politically process ethics. The debate in the Parliament focused almost exclusively on applications in agriculture and food production, possibly because the existing controversies here allowed for the clear articulation of (party) political standpoints (leftwing opposition critical of industry dominance, centre-right parties more interested in growth potential).[143] It seems that the ethical principles as such did not resonate in the political communication *as principles*. Their acceptance depended on a clarification of their *implications*.

The key phrase of the policy paper– which also emerged as a dominant rhetorical theme in the issuing parliamentary debate – was *qualitative benefit*. This entails that genetic engineering must serve purposes other than monetary gain for private enterprises if it is to be deemed ethically acceptable (and – by implication, it seems – also publicly acceptable). However, what did not emerge from the paper or the issuing debate was how and who should establish whether, for instance, a GM crop or a particular technological innovation entails a qualitative benefit.

In the parliamentary debate on the statement paper, wide support was expressed for the principle of including ethical principles in the regulation, although the accentuation of the different principles (or more precisely their implications) varied according to political preference. The left wing opposition expressed concerns that the criteria were too unspecific and did not reflect current practice in the area in terms of the extension of permissions and funding of research. The right wing opposition expressed concern that some of the ethical criteria for evaluation could make society blind to the disadvantages of rejecting gene technology. However, all parties backed the principle that *dialogue with the population is essential*.

The BioTIK Secretariat

The most material result following the recommendations in the BioTIK commission's report, the policy statement paper from the Government and the issuing parliamentary debate was therefore the establishment of the BioTIK secretariat for a four-year period from

[143] Traditionally political parties in the Danish parliament do not enforce party alignment in votes on 'ethical issues', e.g. abortion and similar issues pertaining to interventions in human beings. Here the parliamentarians are to be guided and bound only by their conscience.

2001-2004. The secretariat's dual was task to function, firstly, as a coordinator ensuring that 'ethical' aspects of biotechnology were considered in all Government departments when new legislation and regulation was prepared, and secondly to promote ethical considerations in EU and other international regulations. The aim here was to attempt to equip 'ethical considerations' with an institutional locus, that is to ensure the use of the formulated ethical 'checklist' in political decision making at home and if possible abroad. Secondly, the task was to initiate and 'secure a good debate and dialogue about biotechnology on an ethical basis'.[144] This institutionalised branch of the BioTIK project was hence not a participatory project in itself, and the activities aimed at including ethics in legislation and those aimed at stimulating public debate were considered as two separate strands with no linking mechanism (except overlap in the executive staff). The ethical principles to be taken into account when issuing policies were already formulated and were considered applicable without further inputs from 'the public'.

The secretariat was equipped with two reference points, namely an interdepartmental task force with the participation of nine different government departments to oversee its work and an advisory board consisting of various stakeholders to comment and advise on the public various initiatives undertaken by the secretariat. This design led to a situation where the secretariat had the initiative to suggest various activities, but the task force – and hence individual government departments – practically had veto-rights in regard to suggested activities, but felt little responsibility for carrying out the overall mission of the project. This meant that in practice the secretariat was not always allowed to instigate public debate about politically sensitive issues that could result in questions to ministers, nor did it in practice have any possibility to press for the uptake of 'ethics' in regulation if this was considered disturbing by individual government departments.[145]

One recommendation from the expert report, which was taken up as a cornerstone of the secretariat's work, was the establishment of an Internet portal combining a news service, a common point of entry to all regulatory authorities and regulatory initiatives and a debate forum. The aim was to create easy access to all aspects of the biotechnological debate and regulation in accessible and non-technical language, run by a credible public authority. This initiative won broad political support as the more optimistic political parties saw an opportunity to enlighten the population and probably create greater acceptance for new technologies, whereas and the more sceptical parties saw an instrument to qualify the public debate through the provision of high quality information, which also included 'ethical' and

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[144] From mission statement on home page (www.biotik.dk).

[145] One example given to me was that when the secretariat wanted to experiment with a 'citizens' jury' (as they are known in the UK) on the cloning of husbandry animals, a hearing was established as a judicial trial with barristers and cross-examination of experts. However, as the minister responsible for the pending legislation had not finally decided on the political course of the Government, the trial was not allowed to end in a 'people's verdict', which could be at odds with the political standpoints to be formulated subsequently (Interview with civil servant Mette Gjerskov, the BioTIK secretariat, 16.01.2004.)

broader social aspects of the new biotechnologies. Underlying the establishment of the Internet site was the assumption that the public debate needed both qualification in terms of knowledge and easy access to information – that it was desirable that interested, non-expert parts of the population should be enabled to debate on a qualified basis – and that there was a lack of 'public spaces' for such debates to take place.[146]

Some particular aspects of the BioTIK initiative are worth noticing when considered as a means of enhancing the public's engagement with new technologies from an 'ethical' viewpoint. First of all, in the work of the secretariat, the meaning of 'ethics' is predefined through the expert report and the subsequent formulation in the Government's policy statement. For instance, the secretariat worked to develop a template for a survey of attitudes towards various biotechnological applications based on an operationalisation of the ethical criteria (rather than attempting to explore whether the formulated criteria corresponded with the actual concerns of the members of the public).[147] In other words, it was (implicitly) assumed that because an expert committee had reached a consensus (or a compromise) on what pertinent ethical aspects needed to be considered when assessing new biotechnologies, then these *were* the criteria through which the public had to articulate any concerns with regard to specific applications.[148]

Temporally the established BioTIK secretariat exhibited a strong symbiosis with the political-bureaucratic system. It was launched to run for a defined period of time[149] that was clearly decided 'bureaucratically' rather than 'substantially' (in relation to issues arising, which required ethical reflection or public clarification). Organisationally it was clearly shaped by bureaucratic requirements, namely that a devoted amount of money was spent in the best possible manner within a given timeframe. One could also say that it embodied the assumption that the substantial ethical reflection had already taken place in the expert committee. Therefore the secretariat had the dual task of diffusing knowledge of these principles in the public sphere, and working towards their implementation in legislative work, not to contribute to their 'modification' in the light of emerging issues.

A final distinctive institutional feature of the BioTIK initiative was that no organised feedback channels existed. The task of the secretariat was to create and stimulate debate on

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[146] In addition to this 'information' approach, which included 'quizzes' about ethical dilemmas, testing of knowledge and virtual shopping in a 'genetic supermarket' the secretariat has undertaken a number of other initiatives to enhance debate, e.g. distributing a role play game called 'Master of Creation' elaborating societal issues and conflicts about biotechnologies to all secondary schools in Denmark, organising a number of local debate meetings around the country, and expert hearings. The impact of the Internet portal and other activities have not been measured, and it is not easy to assess to what extent it has influenced the public debate.

[147] Interview, M. Gjerskov and Rambol Management (2004).

[148] This seems to lend some plausibility to Wynne's interpretation that (bio)ethicists are taking over where traditionally natural scientific experts had ruled, so that one expert dominance is replaced with another (Wynne 2001a).

[149] Four years, January 1st 2001 to December 31st 2004.

ethical issues pertaining to biotechnology. However, they were neither expected to attempt to involve 'the public' in regulatory activities, nor to elicit and report the public's view on ethical questions and report that to the political system. Hence, unlike the Board of Technology, there was no organisational link between public information and debate-stimulating activities and the policy process in the BioTIK activities.[150] In their debate-stimulating activities the secretariat has attempted to coordinate their activities with issues on the political agenda, but there were no organised channels through which the impacts of its activities could be conveyed to the political system. In sum it seems that activities aimed at the public sphere can best be described as 'awareness raising'.

The 1999 Consensus Conference on GM Food and Crops

In the spring of 1999 the Board of Technology arranged a consensus conference on 'Gene-spliced foods'. The background of the conference was, like the BioTIK initiative, the resuscitated public controversy in the public domain and several indications that the general population remaind sceptical towards the commercialisation of these new technologies. The initiative was taken by the secretariat of the DBT, which in the first half of 1997 judged that a renewed clarification of the issues surrounding GM crops from the perspective of the general population was required. It was hoped that such a clarification could assist the Danish political system in clarifying its standpoints and strategies in advance of the negotiations in the EU about new directives on deliberate release, applications in food and feedstuffs, labelling requirements and traceability. However, due to other priorities the GM conference was delayed while the EU directives were processed at great speed, to the surprise of the secretariat.[151] Hence, it looked as if the DBT had an unfortunately timed project on their hands, as the principles to guide the new directives had already been laid out. However, it turned out that the passing of the EU legislation and its implementation in Denmark did not remove the GM issue from the public agenda, either in Denmark or elsewhere in Europe, and the DBT judged that the issues were not settled and decided to press ahead with the arrangements.[152] According to the project manager of the conference there was significant perplexity and confusion among Danish politicians about what the reasons for the continued public scepticism were. As such, this particular consensus conference was seen primarily as a means to probe into public concerns and in a sense 'materialise' public debate and opinion (Joss and Klüver 2001: 56).

In the preface of the subsequent report from the conference containing the statements and recommendations of the lay panel it is stated that the background of the conference was

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[150] In an evaluation by a consultancy it is claimed that no substantive results have yet arisen from the attempts to operationalise the ethical criteria into a survey template (Rambøll Management 2004: 9)

[151] Interview with Søren Gram, project manager on the conference (21.01.2004).

[152] Which turned out to be a rather accurate assessment as the work on the directives dragged on and the moratorium imposed in June 1999.

"…. the population's continued scepticism towards gene spliced food. Why does this scepticism exist, and what is to be our attitude towards gene-spliced food now that they really are about to land on the shelves of Danish supermarkets." This indicates three things. Firstly, that persistent public scepticism towards the technology is seen as an anomaly in the social appropriation of new technologies. The renewed probing into public attitudes and concerns was necessary because it was more or less taken for granted that controversies would gradually cease once regulations were put in place. Secondly, it indicates a suspicion that some of the renewed controversy had to do with the fact that the technology was entering a phase of large-scale commercialisation, which could entail new and different concerns. Thirdly, although much of the discussion at the time hinted at a 'market solution' of the controversy through labelling, the *'we'* in the motivation indicates that the DBT framed the issue as one to be dealt with by the polity, and which could not be shifted to a solely market based regulatory regime without prior political and public deliberation.

The lay panel compiled for the conference came up with a series of questions they wished to have explained by the expert panel. These were gathered under ten headings, addressing the following issues:

- To what extent can the production of genetically engineered food alter natural processes? What impacts will the development and production of genetically engineered food have on the environment?
- How will the consumption of genetically engineered food influence the human organism?
- How can a monopoly-like market where a few corporations control safety, supply, price formation and quality of food-stuffs be prevented?
- How can an independent, competent approval procedure and controls for genetically engineered food be ensured?
- How can the consumer be ensured access to adequate information about genetically engineered food?
- What content should Danish/EU legislation regarding liability have?
- What advantages do genetically engineered food entail for consumers?
- What values and ethical deliberations ought to underlie the research, development and production of genetically engineered food?
- How can ethical aspects can be incorporated into approval- and control procedures of genetic engineering in animals, plants and micro-organisms?

As is clear from these topics, the agenda cuts across a vast range of issues and covers both cognitive and normative themes considered essential at the time. To illuminate these questions the steering committee of the conference selected a panel of twelve experts.[153] The

[153] They were:

compilation of the expert panel was the object of some negotiation in the steering group of the conference. As shall be discussed in more detail in chapter VIII this indicates that the consensus conference methodology does not avoid a power struggle among the stakeholders present in the policy arena. However, this is temporally preceded by and thus to some extent made invisible by the deliberative character of the expert panel's interaction with the lay panel. In my interviews the director of the DBT and the responsible project manager readily admitted that the conclusions of the lay panel could be significantly influenced through the compilation of the expert panel, and due to the sensitivities linked to this particular topic, a 'balanced' expert panel in regard to attitudes towards GM agriculture was considered as more important than scientific competence.[154]

After its deliberations the lay panel produced a 12 page final document presenting what the panel had learned through the expert presentations and discussions, and what it would recommend to politicians. The issues discussed were practically all topics present in the mass media debate at the time. Hence, no new issues can be said to have been introduced through the conference, it was rather an assessment by the lay panel of 'already known' problematiques.[155]

The final document opens with a paragraph stating that the production of genetically engineered food without a doubt changes processes in nature. However, experts disagree on the degree of influence and whether the effects are harmful. The lay panel mentions that

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An associated professor (biologist/ecological scientist) from the Department of Environment, Technology and Society, Roskilde University, also affiliated with the association of organic farmers;
A research director from the Danish Institute of Agricultural Sciences under the Ministry of Food, Agriculture and Fisheries (plant biologist),
A head of the section for plant biology and biochemistry at the Risø National Laboratory (public research centre),
A representative of the environmental movement NOAH (Danish branch of Friends of the Earth),
An agricultural scientist from the section on food safety and toxicology at the Danish Veterinary and Food Administration,
A professor of plant biology at the Royal Veterinary and Agricultural University,
A food scientist from the Danish Forestry and Nature Agency under the Ministry of Environment,
A representative of Greenpeace Denmark,
A representative of 'The Consumers' Council' (an association of consumers' organisations in Denmark),
The head of the international section of the food legislation office at the Danish Veterinary and Food Administration,
The head of the patent section of Danisco Ingredients (Danish biotech company),
A researcher from 'Centre for Justice and Ethics' at Copenhagen University,
A political analyst at the Danish Association for Organic Agriculture.

[154] More specifically, the project manager noticed a certain 'skewedness' in this particular expert panel. The steering committee did not wish to expose itself to the criticism that the panel was biased either for or against GM food. Hence, an equal number of 'experts' known to be for and against the technology, respectively, had to be selected. However, as both a number of more traditional 'scientific' and industry representatives were positive towards the technology, the internal balance between different competences in regard to the 'technical/political' knowledge seemed somewhat skewed, i.e. the GM sceptics were overrepresented by 'political' competence and an underrepresented in of 'scientific' competence and vice versa.

[155] Due to the time passed since the conference took place, I assumed it would be rather futile to attempt to reconstruct the communicative dynamic of the procedure itself (no audiorecordings or transcripts exist). Nor does this seem essential for the present investigative purpose.

one viewpoint is that the risk of damage is small, but that damage, should it occur, can have enormous effects. Although nuclear energy is not mentioned, it seems clear that genetic engineering is here being categorised as belonging to those technologies, which could have irreversible, catastrophic consequences and hence require very rigorous controls. As this is chosen as the opening statement, the lay panel signals that uncertainties are central to the challenges raised by biotechnology.

The panel acknowledges that disagreements about the effects of gene splicing are not solely of a scientific character, but are rooted in ideological differences. They claim that this intermingling of scientific information and ideological viewpoints makes it difficult for them to draw adequate conclusions. Nonetheless, the final document articulates a number of assessments and recommendations, which are kept at a very general and principled level.

The report of the lay panel does not reject the application of gene technology in food production as such, but urges caution on a number of issues. The overall interpretation among the organisers[156] as well as other observers[157] was that the thrust of the lay panel's conclusions was a 'Yes, but on the condition that ....' but that the conditions were virtually impossible to fulfil and in practice amounted to a rejection of the introduction of the technology on the existing regulatory terms and for existing applications. Furthermore, one of the more general messages emerging in the subsequent discussions was that the panel had articulated a widespread attitude among the population, namely that in order for the technologies to be acceptable, not only should they be labelled and allow for co-existence with other production forms, a general, societal benefit should be shown in order to justify their application. Economic benefits for producers and farmers were not sufficient to justify their introduction. This has a certain discursive affinity with the stress on 'qualitative benefit' expressed during the parliamentary debate on the BioTIK report.

Impacts of the Consensus Conference

A central question for this thesis is not only how 'the public' is operationalised in participatory events, but also to analyse how such operationalisations mediate the effects of 'public concerns' in the policy arena. This raises the rather difficult question of how to trace the effects of such events, i.e. how 'impacts' should be defined and measured. Depending on what perspective is chosen and what the purpose of such procedures are thought to be, very different assessments are possible. In the case of the work of the DBT in general and consensus conferences in particular with their dual purpose of (possibly instigating and) stimulating public debate as well as feeding the viewpoints of the population into the political system, 'impacts' can be understood in several ways (Hennen 2002). Among the most accessible, empirical indicators are mass media resonance and uptake in political communi-

[156] L. Klüver and S. Gram in interviews.

[157] E.g. J. Toft in interview.

cations of the events and themes that emerged from the exercises, although in principle they cannot stand alone. However, this strategy will be pursued in the following. Later I shall argue that perhaps other more subtle and interpretive assessments may in fact be necessary.

A search in a database carrying all Danish newspapers with the search terms 'Board of Technology' or 'consensus conference' or 'citizens' panel' raging from one week before the conference until 40 days after produced 16 hits. Of these, three were notices announcing the event before it took place, four were reports from the first day of the event covering the expert panels' presentation, two were reports on the recommendations of the lay panel after the conference, and finally there were seven commentaries and letters to the editor commenting either on the procedures or the conclusions of the conference. Of these two were essentially the same letter printed in two different newspapers and two were responses to critique of the conference by the project manager from the Board of Technology. The public radio channels' news also carried a report about the conference.

Several of the reports on the event described the conference's purpose as informing the politicians about the population's view on gene technology and being a contribution to an ongoing debate on the technology without referring to any of substantial issues on the conference agenda.

This can hardly be said to be a powerful media impact, and neither the holding of the conference nor its output was arguably a 'public topic'.[158]

In terms of political attention, the objective traces of impacts are also scarce. A search on the Danish Parliament's Homepage containing all publicly available documents (including verbatim transcripts of all talks delivered from the rostrum and documents from the proceedings of sub-committees) reveals that the conference is referred to five times in the work of the Parliament. I shall list these in detail, as they are telling on the question of how the outcomes of the conference were (not) taken up in the political system.

- The consensus conference is highlighted out as a method for enhancing dialogue about technologies in a hearing response sent from the Danish Ministry of Trade and Industry to the EU commission on its 'Strategic Vision for Bioscience and Biotechnology in the EU'. Positive Danish experiences with this type of conferences are stressed, but no substantial references to the outcome of the conference on GM food or any other conferences are made. The Danish government encourage such

[158] Even if the search is extended up to a year after the conference no more references appear, although the public debate on gene technology certainly continued during this period. It cannot be excluded that other search terms could have found references to the conference, but it seems unlikely that they would substantially alter the picture. Hence, I conclude that it did not initiate much resonance in the mass media.

conferences in other countries and on the EU level. This indicates that the Danish political system is aware that consensus conferences have attracted international attention as a means to address issues that are common to the EU member states, and can possibly function as a sort of institutional export good.

- During the Parliament's discussion of the BioTIK report consensus conferences are mentioned positively in the Minister of Trade and Industry's statement as a means to broaden and qualify the public debate on biotechnology. Here, however, it is claimed that additional methods, which will draw in broader segments of the population are also required. This indicates that although consensus conferences are seen as useful by the political system, issues of some sort of numerical representativeness in public involvement are also seen as important.[159]
- The conference is mentioned by the Minister of Science in a statement to the standing committee on Environment and Planning as an answer to what the Government is doing to ensure independent knowledge and ethical reflection on biotechnology. The conference is described as a successful element in the strategies to create public debate alongside the activities of The Ethical Council and the Animal Ethical Council. No reference is made to the substantial outcomes of the conference.
- Ten days after the conference, it is briefly mentioned during a debate in Parliament about a bill proposed by the left wing opposition (Enhedslisten) to secure the possibility of GM free agriculture through a ban on the release and marketing of GMOs. The Minister for the Environment mentions the conference as showing "that the population is interested in gene technology, that the population has a nuanced view on genetic engineering, but that it does not principally reject it." (Folketinget 1999) 'The population' is described by the minister as being of the opinion that the technology should be applied, as long as it is ensured that adequate precautions are taken. While this is not a false interpretation one could argue that it is one formulated to serve the cautious, but basically positive stance of the then Government. More importantly, it shows how the lay panel's complexity reduced formulations in the final document are reduced even further to fit a political agenda. The fact that this interpretation is not contested by any parliamentarians suggests – but of course does not prove – that the output of the conference may not be known by the parliamentarians participating in the debate.
- The report from the conference was distributed among the members of the standing committee for Food, Agriculture and Fisheries, which is where many of the

[159] As I shall show in the next chapter, this can be likened to the British case, where civil servants pointed out that the organisers of the public consultation on biosciences had to supplement the applied qualitative methodology with representative data for it to appear credible in the eyes of politicians.

technical aspects of GM regulation are processed by the Parliament. There are no indications that the output from the conference was made the object of a focused debate by the standing committee.

It is not entirely clear what to make of the scarce references to the outcomes of the consensus conference. The Board of Technology is an organisation created and funded by the Parliament to provide advice on technological matters. Hence, it would be expected that evaluations and recommendations would be applied in the work of the Parliament. Still, it seems as if the substantial outcomes of a conference on a topic debated several times since in the Parliament scarcely received any attention. (Of course, this investigation does not allow me to assess whether the individual politicians had read or taken these into consideration). However, the fact that the conference is referred to several times as a good procedural tool to initiate and sustain public debate could indicate that it was seen more as a ritual of attention to public concerns, rather than fulfilling an actual need for information on which to formulate policies.

However, the conference may have had other impacts, which are not easy to trace in a reliable manner. At least two such channels deserve mentioning.

The responsible project manager in the DBT claims that there was a significant informal interest among politicians, as they realised that controversies had not been settled through the passing of EU legislation. During the political discussions about revisions of the EU directives, several parliamentarians contacted the DBT to get briefings on the results, which were generally viewed as reliable insights into what public concerns were about. Therefore, the outputs may have flown into the political system through the attention of individual politicians to the public concerns and hesitations expressed in the conference. Such informal contact is however virtually impossible to trace in a research project like this.

Secondly, another type of impact stressed by the director of the DBT is the effect of participation in the conference on the expert and stakeholder community. It was his assessment that the largest impact of this particular conference was to be found here. The assumption is that the perspectives of the 'epistemic communities' of expert and stakeholder communication is modified as a consequence of taking place in front of a lay audience. Hence, consensus conferences may potentially impinge on innovation in more subtle and indirect ways than through explicit uptake in political communication and regulatory principles. However, he also acknowledges that in this particular topic area there were so many other debating activities going on – also of a participatory and deliberative character – that it is very difficult to significantly alter the agenda through a single event limited in time.

Danish Policy Subsequent to BioTIK and the Consensus Conference

Both of the initiatives described above took place or were reported in 1999 (the BioTIK policy statement was debated in Parliament in 2000). Since that time there has been significant policy activity in the agricultural biotechnology domain, and it seems worth trying to assess the impacts of the procedures. Such an assessment – as complex as it is in the Danish context – is further complicated by the fact that most regulatory competence is located at the EU level (and is also conditioned on the global level by the WTO negotiations). Therefore, effects can perhaps most conveniently be assessed by looking at the position taken by the Danish government on various issues in EU negotiations, since the actual dynamic of the EU policy arena cannot be retraced here.

After the principled parliamentary debate in April 2000 the position of the then Social Democratic government and the subsequent neoliberal/conservative government can be described as one of principally favouring GM agriculture, but proceeding with great caution in practice. Despite their greater rhetorical allegiance to freedom of innovation, in practice the neoliberal/conservative government has been only slightly more GM positive than its predecessor. This assessment is based on several observations.

In negotiations in the EU about the revision of the directives regulating GM releases into the environment, safety approvals of food and feedstuff, and labelling and traceability, Denmark has pursued one of the most restrictive positions. They argued for the most extensive risk assessments possible, very low thresholds for the acceptance of adventitious presence of GM material in non-GM food and for a labelling and traceability regime that would include products based on GM crops, but where no traces could be measured (e.g. labelling of meat and dairy products from livestock fed on GM crops).

Denmark also advocated the inclusion in the directive on deliberate release the possibility for national authorities and the EU commission to consult an 'ethical advisory body'.[160] This was included, although, as shall be mentioned later, with little practical effect. When the directive on deliberate release was implemented in Denmark, the four 'guiding principles'[161] formulated by the BioTIK commission were included in the preamble of the revised law on the deliberate release of GMOs. The law also extended the consultation procedure in relation to approvals in a manner that went beyond the requirements of the directive,

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[160] Similarly, it is stated in the directive on food and feed stuff that in addition to risk assessments 'other legitimate concerns' can be taken into consideration when authorising GMOs for food production. However, it is not defined or specified what 'other legitimate concerns' consist of, nor what role they can play in regulation (Poli 2003).

[161] That the application of biotechnology should aim to 1) secure economic and qualitative benefits, 2) respect autonomy, dignity, integrity and vulnerability of human beings, animals and nature, 3) secure a just distribution of goods and burdens and 4) foster participation and transparency. (Forslag til lov om ændring af lov om miljø og genteknologi, 2002 (www.ft.dk/samling/20012/lovforslag_som_fremsat/L131.htm))

not only allowing recognised stakeholders to comment on suggested regulatory approvals but individual members of the public as well.[162]

When the EU passed the revised directives on deliberate release and the new directives on food and feedstuff as well as labelling and traceability as a prelude to lifting the moratorium, the one key policy topic left to the individual member states was the formulation of the rules for co-existence between GM, conventional and organic agriculture. At the time of writing Denmark is one of the few countries that have completed legislation on this topic, and in a manner that is considered quite restrictive.[163] Yet Denmark remained opposed to the lifting of the moratorium to the very end, allegedly because the rules for coexistence were not quite in place when approvals of GM crops were slowly resumed in the summer of 2004.

All in all it seems that the Danish policy on GMOs has practically been as restrictive as possible short of an outright ban, and in European comparison Denmark has been among the most hesitant countries to accept the application of GMOs in both agriculture and food production, which in fact is well in line with the concerns articulated by the lay panel in the 1999 consensus conference. There are, however, a few additional circumstances, which must be taken into consideration to complete this picture.

The 'principles' formulated by the BioTIK commission were included in the preamble of the legislation. However, whereas the technical requirements applicants must fulfil to achieve an approval were specified in extensive detail, it was not specified how such ethical criteria were to be assessed, nor who would be responsible for such an assessment. No special organisational locus has been established for assessing the ethical aspects of agricultural GMOs and the responsible regulatory agencies are as far as I have been able to establish not equipped with employees with particular 'ethical' competences.[164] Hence, the GM sceptical NGOs considered this inclusion of ethics as rhetorical window dressing. In my interviews, representatives of NOAH claimed that in their experience objections based on 'ethical' arguments or arguments about a lack of 'qualitative benefits' never had any influence on the decisions made by the responsible authorities.[165] As such, it seems that although 'public concerns' are meant to be channelled into regulation through 'ethical principles', in practice only technical risk assessment are undertaken (though possibly in a more

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[162] Normal Danish practice is that the comments following a specific piece of legislation specify what stakeholders are to be consulted on e.g. changing legislation, or administrative decision making.

[163] Opting for mandatory registration of all GM planting, obligations to inform neighbours and erect 'safety' belts to hinder pollen flows and the establishment of a fund for compensation in the case of adverse effects.

[164] In the law it is made possible for the responsible minister to 'consult a Danish ethical body about principled issues regarding gene technology, which occupy the Danish public' (Forslag til lov om ændring af lov om miljø og genteknologi, 2001). However, no such body has been established, although the purview of the 'Ethical Council' is currently being expanded to potentially include agrifood issues.

[165] Interviews J. Toft, B. Normander

thorough and restrictive manner).[166] As technical risk assessments are rather complicated procedures (mostly carried out by the applicants themselves) it seems somewhat doubtful that the rights of individual citizens to submit objections will have any significant effects at the operational level of administrative decision-making.

It thus seems that the public concerns articulated in the initiatives investigated, which – with reference to the investigations reviewed in Chapter I – can perhaps best be described as a somewhat vague uneasiness with the intended and unintended effects of techno-scientific dynamics in the agri-food domain, have had some effects on the political system's 'attitudes' towards biotechnology. However, this is modified partly through the EU framework, and partly, perhaps more fundamentally, by a need for translation into frames where it can be handled bureaucratically or technocratically. However, research indicates that a significant part of concerns are exactly rooted in the perceived inadequacy of technocratic governance, because risk assessments rarely facilitate or even permit a more extensive evaluation of the purposes behind a given technological trajectory. In essence, public concerns of a socio-economic/cultural/ethical nature have been responded to by making technical risk assessments more comprehensive and requiring labelling, and not by attempting to establish a stronger political guidance. Therefore, one may speculate whether the analysed initiatives will in fact be able to absorb future protest potential.

Analytical Perspectives on the Danish Case

Having described in some detail two central Danish initiatives aimed at addressing the relationship between public concerns and policy making regarding biotechnology and the context in which they were located, I shall now assume a more interpretive and analytical stance. To that end I shall attempt to characterise the two Danish initiatives according to the questions posed by the scheme developed in Chapter IV. The ambition is to tease out the social and communicative mechanisms aimed at and those actually provoked through the processes. In short, to explore in more detail how the perceived need to involve the public is operationalised. By contrasting the two initiatives, I hope to bring out their individual features more clearly. For reasons of descriptive parsimony, this needs to be done in a somewhat stylised manner, which can hardly do full justice to the real social processes in play and may arguably exaggerate some of the differences. I hope, however, that this will create a reasonably sound basis for a comparison with observations from subsequent cases. Following this I shall attempt to assess the impacts of the two events in combination and reflect upon their ability to facilitate an uptake of public concerns in the regulation of tech-

[166] Fundamentally, this means that ethical assessment is something that at best enters into consideration subsequent to 'factual' risk assessment, but not as something that can either guide the developmental logic of technological trajectories or be involved in the selection and operationalisation of the models according to which potential risks are assessed – a process that inevitably entails choices among values but is mostly made invisible through technical framings (Levidow 2001, Levidow and Carr 1997).

nology. This will be discussed as a question of creating resonance, which, I will argue, is a challenge to all procedures with participatory and deliberative intentions, but it is particularly pronounced and evident in the Danish case. In doing so, I shall finally seek to account for a somewhat peculiar fact, namely that the procedures analysed here appeared to have created little resonance, and yet the Danish policy in this domain seems, comparatively, to be relatively in line with public attitudes (within the degrees of freedom for the Danish political system to operate in respect to EU regulation).

Characterising the Danish Initiatives – Framings and Dynamics

In the *social dimension* the BioTIK commission is characterised by consisting of an exclusive group of *experts*. These were appointed by the Ministry of Trade and Industry with the task to deliberate primarily with each other on what the nature of public concerns could be and how they could be responded to *ethically*, i.e. it as assumed that 'public concerns' primarily had to do with the absence or lack of explication of values in the social regulation of biotechnology in a broad sense. The experts investigated what public concerns were and by what values political responses to these concerns should be guided by. However, no direct flow of information from the public to either the commission or decisions makers was established. In this process one can therefore only talk about a 'virtual' inclusion of the public – 'the public' is communicated about rather than sought included in communication. Subsequently an unorchestrated public debate was initiated to further clarify of value-based assessments in the population. However, this was not fed back into political communication in any systematic manner either.

In the consensus conference a small selection of *lay people* chosen to represent 'the public' in a democratically 'dignified' manner was engaged in deliberation with experts and encouraged to make recommendations to policy-makers.[167] Here lay people function as assessors and mediators of divisive expert knowledge claims and put their assessments at the disposal of policy-makers.

In terms of facilitating public confidence in regulatory frameworks, the BioTIK commission was initiated on the assumption that the possibility to debate and clarify the 'values' underpinning the political guidance of biotechnology (distinct from all matters 'technical') would help ensure public trust in regulation and innovation. It seems that the implicit assumption behind this approach was that the willingness of the public to delegate competence to policy-makers and regulators should be rooted in the willingness of policy-makers to make explicit value commitments, which should in turn actively influence what they would support and allow, and what they would work against. In the subsequent work of

[167] 'Dignified' in the sense that they were selected to speak on behalf of the public understood as 'ordinary people'.

the BioTIK secretariat the attempt to ensure public confidence consisted mostly in making the political and regulatory processes transparent.

The public confidence perspective that can be read into the consensus conference format consists in letting 'ordinary people' articulate their concerns and attempting to create attentiveness among legislators. This meant that willingness to delegate decision-making competence was perceived to hinge primarily on the *attentiveness* of policy makers to the concerns of 'ordinary people' and that such concerns are given a significant weight compared to other interests trying to influence policy formation.

Regarding the social mechanisms designed to mediate between different perspectives on what the issues at stake with regard to biotechnology actually are, it can be argued that the BioTIK commission proceeded on the assumption that the required mediation was between different ethical principles, or rather that an adaptation of a consensual ethics should facilitate a mediation between, for example, diverging cognitive assessments or socio-economic interests by providing 'a common language', a meta-frame to embrace all viewpoints ('cultural' and 'functional') in Danish society. The commission sought an all-inclusive compromise by claiming that different ethical principles (utilitarianism, ethics of integrity and discourse ethics) were all necessary for assessing different applications of biotechnology rather than choosing between them or trading them off against each other in a principled manner. In effect the concrete choice or trade-off process was delegated to public debate and the political process. Hence to the extent that 'mediation' was envisioned, this was to take place primarily through an *explanation* of the different modes of ethical consideration (in practice by establishing a sort of ethical checklist).

The consensus conference, with its attempt to compensate for a lack of numerical representativity with other maximum socio-demographic variation possible among 15 people, can be interpreted as an attempt to mediate through a discursive procedure (in the Habermasian sense) by encouraging mutual respect for all articulated viewpoints. The procedure entailed a very clear role differentiation between experts and lay people, and made the lay panel responsible for mediating different viewpoints and concerns.

In the *temporal dimension* the two approaches also display some differences in their underlying assumptions. They were in a sense both conceived as a response to what was considered a temporal anomaly in the social appropriation of a promising technology, namely persistent public hesitation towards what the protagonists of the technologies considered some very promising applications. The BioTIK commission was established to make up for what was perceived as the absence of an explicit value basis for biotechnology policy making, and proceeded to articulate some *generic* ethical guidelines, which were meant to influence regulation *prospectively*. Compared to this the consensus conference functioned primarily as a *retrospective* articulation of the reasons why the population *still* proved reluctant to accept GM food rather than a *prospective* articulation of what ends the lay panel would like to see encouraged in regard to the technology. Their suggestions primarily focused on in-

adequacies in the then existing regulatory framework and principles, that should be rectified for them to feel less uncomfortable with the application of biotechnology. If there was a specific temporal message from the recommendations of the lay panel, it was that the technology was moving too fast to acquire confidence among ordinary people. This may be a product of the framing from the DBT-steering committee, who asked question to the lay panel focusing on what was to be done in the area in terms of regulation, not regarding more 'strategic' governance of the technological trajectories, which was probably perceived by both organisers and lay panel to be something beyond Danish political and regulatory intervention.[168] This means that where the work of BioTIK proceeded on an assumption that public confidence could to develop through a prospective inclusion and articulation of 'values', which were conceived in a rather a-temporal manner, into regulation, the consensus conference can be seen as a recognition that a perpetual re-articulation of public concerns (in an organised manner) is desirable and necessary to maintain public confidence.

In terms of mediating between different perspectives the ideal propagated by the BioTIK work was, as mentioned, that ethical principles can be formulated in a generic manner, but that these principle must be traded off against other 'non-ethical' considerations in a perpetual public debate taking issue with specific technological developments. The understanding of the DBT was not that different, the Board also seems to think that a constant public debate about new technologies is the democratic ideal for the governance of technology.[169] However, in practice the consensus conference format does not really facilitate a perpetual public debate but a temporal snap-shot of public concerns, which can hopefully be fed into the political system at strategic points in time in relation to the policy agenda.[170]

Although the two initiatives are both occupied with the relationship between public opinion and acceptance and the social regulation of biotechnology, they do exhibit differences in the *substantive dimension.* Both initiatives were clearly technology induced. In the work of the BioTIK commission public concerns are pre-framed as 'ethical' and value based. This was more or less defined by the terms of reference for the expert committee's work, although it was contested by some of the members, who felt that the separation of ethics from other dimensions in the social management of biotechnology was somewhat artificial. This in turn led to a relatively broad conception of what 'ethics' are, and in some sections

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[168] When asked about whether the DBT had 'pre-framed' the topic of the conference to be 'only' about *how* GMOs ought to be regulated rather than asking the more fundamental question of *whether* GMOs should be accepted, the project manager at the DBT replied that GMOs were already not only a technological but also a political reality, and that this was the point of departure for the Board's activities. This, however, would not have prevented the lay panel from taking up issues of whether GMOs were to be accepted at all, if they had so desired. However, the panel did not do this, according to the project manager probably because they did not perceive this to be a feasible question (Interview, Søren Gram).

[169] Though the Board would probably not privilege 'ethics' in any particular manner

[170] An ambition which did not seem to be fulfilled in the specific conference scrutinised here as it suffered somewhat from unfortunate timing.

of the committee's report ethical reflections seems to be more or less equated with democratic debate. However, the specific contribution of the BioTIK initiative was the formulation of a particular and unitary 'ethical perspective' to be applied to issues pertaining to questions of 'values' raised by the adaptation of all sorts of biotechnology in a number of societal domains (i.e. more or less the same value issues were seen as pertinent to medical, agricultural and industrial applications). The consensus conference, on the other hand, was thematically more focused as it was only occupied with the application of biotechnology in the agricultural and food domain, but took a much broader stance in terms to the issues requiring public assessment, including the social management of cognitive uncertainties, regulatory mechanisms and principles, socio-economic impacts as well as 'ethics'. This can be seen as a manifestation of different assumptions about what should be at the basis of public confidence in regulation. In the BioTIK initiative the primary emphasis was put on the willingness of the regulatory system to be guided by commonly shared values. Allegedly these values are present in civil society (claimed to be relatively homogeneous) and the task of the expert committee was to articulate these in a clear and operative manner and put them at the disposal of both policy makers and continued public debate.

Compared to this, the consensus conference arguably sustained the necessity of safeguarding the regulatory competences of the political system, i.e. the ability of the state to actually control the effects of biotechnology on nature and society, independently of whether the need for regulation was 'ethical' or otherwise. [171]

The BioTIK initiative aimed at mediating between different perspectives on and evaluations of biotechnology by means of formulating an integrative ethical framework, which should influence regulatory agendas across the board. Allegedly, this can be done by articulating principles, which should be able to find wide support, i.e. ethics is fashioned as a mode of observation, which is potentially beyond bias and interests.[172] As such, I will interpret the initiative as primarily expressing a bureaucratic (hierarchical) cultural bias, where the development and *adherence to rules and principles* are seen as essential for the successful mediation of different perspectives. The consensus conference sees 'common sense' as the more genuine type of rationality through which different (functional) perspectives can be mediated. Therefore it is required that 'ordinary people' (the periphery), free of interests articulate concerns about elite decision making (the centre). As such the consensus conferences perhaps lean towards expressing an egalitarian cultural bias as discussed in Chapter III.

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[171] This may be a product of the concerns articulated by organised GM sceptics in the initial phases of GM commercialisation, when the first imports of GM soy was taking place ,that Danish authorities were somewhat impotent in the face of Monsanto's attempt to muscle their products into European markets.

[172] Although there seems to be a certain tension in the report between suggestions aiming at making 'ethics' a common master frame to potentially influence all biotechnology policy and a more modest ambition to make it a complement to existing regulatory mechanisms.

I have summarised the observations from this section in the following table:

	Risk controversy thematic:	**Trust thematic:**	**Mediation thematic:**
Social	BioTIK: Experts deliberate on 'public concerns' and make recommendations to policy makers + unorchestrated public debate (virtual inclusion) CC: (Exclusive) lay panel deliberates with experts and formulates recommendations. Lay panel as assessors of expert knowledge claims (*direct inclusion* of limited number of people)	BioTIK: Ethical guidance of technology suggested to ensure public confidence (delegation to be based on value commitments expressed by decision makers) CC: Representatives of 'ordinary people' articulate concerns in specific policy domain, which is fed into policy discussions (delegation on basis of attentiveness to 'ordinary people')	BioTIK: Compromise between different ethical principles in commission (mediation through explication) CC: Socio-demographic variation in lay panel assumed to mediate plurality of viewpoints (mediation through social learning and mutual respect)
Temporal	BioTIK: Generic ethical guidelines formulated to influence regulation prospectively when public controversy becomes evident (prospective articulation in light of principles) CC: Conference used to articulate present concerns when these became more prolonged than expected (retrospective articulation in light of experiences)	BioTIK: Public confidence to *develop* through prospective inclusion and articulation of values in regulation (a-temporal value fixation) CC: Public unease with *existing* governance and desired changes articulated (perpetual re-articulation of concerns desirable)	BioTIK: 'Ethics' to be traded off against other considerations through public debate as technological development proceeds CC: Snapshots of public concerns to be considered in policy making at strategic points
Substantive	BioTIK: Public concerns (pre)framed as 'ethical' (=value based) CC: Public concerns articulated as pertaining to cognitive uncertainties, socio-economic effects and value issues. (Fundamental rejection of technology not on agenda)	BioTIK: Governance of technology must be based on commonly shared *values*, crystallised in civil society' CC: Governance of technology must be based on generally trusted political *control*, which requires attention to public concerns on their terms	Dominant cultural bias in procedure BioTIK: Bureaucratic (procedural), regulatory agendas should be complemented with 'ethics' CC: Common sense (critical), representatives of 'ordinary people' articulate concerns about elite decision making

The Problem of Resonance

As briefly touched upon above, assessing the impacts of participatory and deliberative procedures is no straightforward task. The policy arenas, in which the governance of technol-

ogy is shaped are a multi-layered ensemble of communication, which is not necessarily ordered according to any simple or unitary logic, and it is not self-evident where to look for traces of the kind of procedures explored here.

The two initiatives scrutinised here present the social scientific observer with an explanatory and interpretive challenge. On the one hand it seems that the political system has been willing to devote resources and attention to addressing public concerns in the domain of biotechnology, and that it has been willing – at least rhetorically – to modify technocratic dominance over policy formulation to a significant extent by permitting the 'ethics' and concerns of 'ordinary people' to be articulated in a dignified and officially legitimate manner. On the other hand, however, it has been difficult to trace any substantive effects in regulatory principles and practices that can be attributed (directly) to these procedures. I will take this apparent paradox as an occasion to discuss in more general terms an issue, which I consider to be common to most participatory and deliberative procedures, namely what I call the *problem of resonance*. Subsequently, I shall briefly discuss why I believe that instead of seeing the Danish policy in this domain as the product of an undetected resonance of the two procedures investigated, it is more fruitful to see both the policy *and* the two initiatives as two different effects of a common cause, namely a more longstanding political culture of public debate on new technologies.

As a methodological issue resonance poses different challenges depending on whether it is posed to organisers of participatory or deliberative procedures (the self-descriptions of the procedures) or external (social scientific) evaluators. In the first instance the problem is about how to *achieve* resonance, in the second it is about how to *measure* resonance. Both are of relevance here, but I shall focus primarily on dissecting the first as this is intimately connected to the question regarding how the public is operationalised in such procedures. It should be mentioned that in the section above in which the consensus conference is analysed, I have applied some rather crude measures of resonance by simply looking at references to the event in contexts I expected to be central to the issue at hand, namely political communication (parliamentary activities) and mass media attention. I argued that in this particular case, this rather crude approach was relatively unproblematic because it was evident that there was in fact very *little* resonance achieved.[173] This meant that the task of tracing the effect of particular ideas or discursive frames across different domains was of secondary importance (it will be more of an issues for my other cases).[174] The work of the BioTIK commission left more discursive traces, both within political communication and in the subsequent attempts to stimulate broader public debate. The two initiatives pose

[173] A fact that was partly admitted to me by the interviewees at the DBT.

[174] I have not attempted to trace possible impacts of the conferences in expert communities or among organised stakeholders. See Joss and Klüver (2001) for such an assessment.

slightly different issues in relation to the question of resonance, which will be discussed in turn, based on the assumption that these experiences may have something more general to tell about the challenges posed to bringing 'public concerns' into the governance of science and technology.

If in this context we generally understand *resonance* as the transfer of particular issue framings from one to another or several communicative contexts, the challenge for participatory or deliberative procedures arguably consist in making *their* distinctions relevant in outside contexts, be this the political system, regulatory institutions, centres of techno-scientific innovation or the mass media public sphere. If a particular way of framing issues is transferred from one context to another, we can speak of resonance. In general, the issue of resonance is applicable to the conditioning of any two communicative systems by each other. In this context the issues of resonance can then in principle be posed between such procedures and other organisational and functional contexts. I will, however, limit my interest primarily to the effects on the political system and its organisations (and to a lesser degree the mass media system). In this case this will mean that a particular mode of observation or problem framing pertaining to biotechnology is transferred from the (organisational) context where public concerns are articulated to contexts where policy is conceived. Whether such resonance can be achieved, in a general consideration, probably dependent on a host of factors, some more contingent than others. I will suggest four such factors, which I judge to be of fundamental importance for the creation of such resonance, and characterise the two Danish initiatives in regard to these.[175] (The problem of resonance is most pronounced in the Danish case. However, in the comparative Chapter VIII I shall clarify how some of these factors are configured in the other cases, resulting in different outcomes).

The four factors arguably of central importance for whether participatory or deliberative TA procedures can achieve resonance are legitimacy, relevance or compatibility, organisational links and (external) mobilisation potential.

Legitimacy. If participatory and deliberative procedures are to achieve resonance in contexts where the governance of science and technology is shaped (and fulfil the aim of democratisation often present in the self-understanding of the organisations in charge of them), they need to be seen *in these* contexts as *legitimate* representations of 'the public' or a relevant subsection thereof. This is why claims from (even very loud) social movement actors are not always 'taken seriously', they are seen as professional alarmists, not true representatives of the general public although the often claim to be so.

Relevance/compatibility. It is not enough that such procedures are seen to articulate genuine and legitimate concerns, the articulation needs also to be *relevant* for the kind of decisions

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[175] These four factors are not derived from any source in particular but inspiration is drawn from a large array of literature on organisational aspects of technology assessment.

being made and exhibit *compatibility* in terms of themes and levels of complexity of the issues at stake. For example, the argument that 'the population don't want it' (whether true or not) is not *per se* relevant to a regulatory regime based on assessments of physical risks as understood by mainstream, regulatory science in a liberal regime (as discussed in Chapter I). When viewed in this manner the problem of resonance can be seen as the flip side of the tendency of autopoietic systems to *immunise* themselves against intrusions into their operative autonomy (see Chapter III). When little resonance appear in intersystemic relationships it may then both have to do with communicative incommensurabilities (lack of relevance) and with a more active 'fending off' foreign communication to maintain the identity of the receiving system or to defend present system states, e.g. political pre-commitment to GMOs in the light of articulated public discontent.

Organisational links. All other things being equal, it must be expected that the communicative transfer of problem framings from one context to another will be smoother if there is some kind of organisational link, which can facilitate and focus 'attention' in the addressed organisational context. From the perspective of procedural design, this will ideally entail some kind of prospective commitment on the side of the addressee before the process is initiated.

Mobilisation potential. Finally, it seems reasonable to expect that the attention of the addressed organisation is enhanced if it perceives itself to be the object of public attention,[176] which may turn nasty if the articulated concerns are ignored. Not only are the quality of the articulated concerns important, so is the ability to orchestrate collective actions to back them up.

When the two Danish initiatives are characterised according to these dimensions, the following observations can be made:

It seems that despite the fact that the consensus conference format includes very few 'ordinary people' (usually around 15) it is generally considered by the political system in Denmark as a legitimate and reliable articulation of the concerns of the broader population. As shown, the Danish government considers consensus conferences as a democratic procedure worth exporting to other contexts. Nonetheless the relevance and compatibility with regulatory activities seems more questionable. The output from consensus conferences may well give legislators a snapshot of what preoccupies ordinary people about a given technology in a fairly holistic manner. However, in the procedure investigated the observations

[176] i.e. perceives itself observed in the medium of 'the public', cf. Chapter III

and recommendations made by the lay panel were arguably under-complex compared to the regulative issues at stake and their institutional framework.[177]

The fact that the DBT is a parliamentary institution (though not one closely integrated into the political system) should in principle provide relatively favourable conditions for creating resonance between the consensus conference procedure and communication in the political system.[178] Nonetheless, little such resonance with either the political system or the mass mediated public sphere was registered.

Finally, it seems that the consensus conference commanded little interest in the NGO community, which mostly saw it as a legitimating exercise for decisions taken elsewhere. The fact that the conference had a mediating (consensus seeking) aim made it rather less interesting for NGOs to mobilise around, although the lay panel did in fact support a number of the viewpoints articulated by the organised GM sceptics. Basically, the message from the conference had few advocates beyond the DBT, which may account at least in part for its relatively modest impact.

Formulated more generally within a systems theoretical perspective it can be argued that by attempting to holistically embrace a broad spectrum of systemic references or perspectives on biotechnology (political, scientific, economic, legal) in one procedure, events like consensus conferences may in common sense considerations appear very promising. However, given their event-like character, they run the risk of appearing under-complex and thereby irrelevant from all systemic perspectives. Because the functional systems are highly specialised, they are more or less immune to communications proceeding in other codes than their own, despite the fact that most technologies are shaped exactly by the 'interaction' of multiple systemic dynamics. Of course consensus conferences are primarily addressed to the political system, the self-understanding of which is arguably to condition the workings of other systemic contexts. However, exercising such steering capacities requires significant knowledge about their working principles, which is difficult to convey through such a procedural format. Hence, although consensus conferences may be democratically sound from a normative perspective, they seem less robust from an instrumental perspective where their effects are likely to hinge on a number of contextual features rather than their procedural qualities.

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[177] When for instance the lay panel recommends that it should be ensured that "...consumers are ensured a a genuine access to non-GM food" (Teknologirådet 1999: §8), this can of course be adapted as a policy goal by the political system (which it in fact was), but it still leaves quite a scope for interpretation not only about what regulatory mechanisms are required, but also about what GM free food actually *means*.

[178] One may of course speculate whether a more direct link to the agencies responsible for writing up and administering regulation would lead to a greater resonance than a filtering through the Parliament. In the present institutional set-up none of the agencies actually occupied with the regulation are to my knowledge encouraged to take account of public concerns as they are articulated in consensus conferences.

The activities in the BioTIK initiative were configured somewhat differently along these dimensions. The statement from the group of experts was commissioned by the executive branch of the political system, which initially compiled the composition of the committee. As the statement was primarily a formulation of a set of normative principles it was not as such an articulation of public concerns, though it was implied that the formulated principles embraced the latter. For these two reasons, its legitimacy in the political systems did not really seem to be an issue, it was accepted as one among other pieces of policy advice. However, just as the concerns articulated in the consensus conference may be 'relevant' but not operational, so it proved difficult for the ethical framing to impact significantly on regulatory principles and practices. The problem here was not one of 'complexity', but relevance still proved to be critical. From the parliamentary debate it is clear that 'ethical' framings did not induce much political resonance as such. 'Ethics' was used as a label for something, which, as a matter of principle, should be present when making political decisions, but it did not seem to significantly alter political or institutional priorities. Rather it was used for ornamental functions in the legislation, but with little actual effect. This is despite the fact that organisationally both the work of the commission and the subsequent activities of the Secretariat were closely linked up with the political system. This is partly to do with the embedding of Danish policy making in the wider European context where the kind of ethical principles formulated in the BioTIK work found even less resonance. However, from the perspective of the theory of functional differentiation, this can also be interpreted as an indication that 'ethics' does not provide an adequate framework within which the complexities accompanying technological innovation can be processed communicatively as problems in science, the legal system or economics.[179] Finally, it seems that the kind of ethical principles formulated in the BioTIK work did not have much appeal among the GM sceptic NGO community, which found it implausible that such principles would significantly influence a technological trajectory deemed undesirable. Hence, the work of the BioTIK committee did not induce any 'public' mobilisation, which could potentially have ensured it more resonance in the political and regulatory contexts.

As no attempts were made to channel information from the public debate on biotechnology based on the normative principles outlined in the expert committee's work into political communication, only very indirect effects can be expected to have taken place. For these activities it therefore hardly makes sense to discuss issues of legitimacy and relevance because the organisational link was completely absent.[180]

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[179] "...die Dominanz funktionaler Differenzierung, wenn und soweit sie sich als Formprinzip der Gesellschaft durchsetzt, die Moral evolutionär abhängt und ideologisch wie motivational dispriviligiert." (Luhmann 1978: 90, quoted from van den Daele 1986: 160).

[180] Initially, the NGOs involved with the work had an ambition, it seems, to use the established Internet site as a platform to reach a larger audience for their mobilisation efforts. However, in the eyes of the NGOs the civil servants managing the site valued neutrality and quantity of information higher than engagement and relevance, and the NGOs withdrew from the activities. (Interview, J. Toft.)

Given that the exploration so far has indicated that two central Danish initiatives aimed at exploring and addressing public concerns in regard to biotechnology appears to have had limited resonance in the relevant political and regulatory institutional contexts they were allegedly addressing, i.e. neither political decision making nor regulatory practices appears to have adapted the framings articulated in the initiatives in anything but a superficial manner, how may one account for the comparatively hesitant Danish position in the EU context?[181]

Here a disclaimer may be called for. The postulate that the two initiatives have achieved only little resonance could in principle be the result of an insufficiently sensitive research methodology – that I have not been able to register the effects of the two procedures in sufficient detail. However, I will suggest a different interpretation, an interpretation that in part points to the necessity of slightly different research methodologies to explore these issues more thoroughly, in part one that urges a less optimistic assessment of the use of one-off deliberative and participatory procedures and 'events' to intervene in technological trajectories and mitigate technological controversies.

My conclusion from this enquiry is that the relationship between the two initiatives scrutinised and the subsequent Danish policy regarding GMOs is probably better seen – and ought to be investigated as – one of co-founding rather than of causality. They are, so to speak, both the product of a longstanding culture of debate on new technologies, rather than the one (the procedures) the cause of the other (policy). One implication of this interpretation is that in order to properly understand how public concerns or public discourses impact on or condition policy-making and regulatory principles, a longer temporal perspective may in some cases be required. Similarly, this interpretation indicates that attention needs to be devoted to more subtle mechanisms of the discursive transmission of issue framings than clear and observable transfers as carried out.

It seems that in the Danish case the mere presence of an organisation like the Danish Board of Technology (for which the articulation of public concerns is a central element of organisational self-understanding) in the institutional landscape for an extended period of time, aside from its specific activities, has apparently made the Danish political system more sensitive to cultural reservations regarding technologies than in other contexts. This, combined with the activities of NGOs, has – over a prolonged time span – developed a sensitivity in the political system to the fact that technological innovation and the (cultural) evaluations of the population of these appear to evolve – at least in some technological

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[181] To pose the question in this manner can of course be seen as biased in the sense that it assumes that the 'natural' or default attitude of the political system is one of embracing and promoting biotechnology. I believe, however, that this is justified, as the majority of the political system in Denmark does adhere to a growth oriented and optimistic position in other technological domains and is, in other contexts, keen to emphasise research and innovation as a important factor for the maintenance of welfare.

domains – according to different and unsynchronised temporal orders, and an acceptance that a cautious political attitude – substantially as well as rhetorically – is required. This means giving space for the articulation of concerns – but not necessarily adhering to them.

This said, it must also be noted that the Danish policy response was not formulated by attempting to intervene substantially in the technological trajectory, but by stricter regulatory requirements and oversight. Although the concerns articulated in the consensus conference as well as in by BioTIK commission arguably express profound reservations among parts of the population towards still more industrialised agricultural production systems, the political response has basically consisted in slowing down this process and raising the safety requirements, and not in a fundamental questioning of the substantive aspects of the technological trajectory. For this, of course, a host of reasons can be given including conspiratorial or moralistic ones that see public involvement initiatives as mere 'lip-service' to participation. I will suggest that from a systems theoretical perspective seem to have less to do with ill faith or hidden motives among politicians and more to do with some deeply ingrained structural features of modern societies that are fundamentally 'programmed' to operate on the basis of constant innovation. When it comes to technological dynamics few mechanisms are available, to stay continue in the vocabulary to create resonance for 'cultural' framings where such technologies are shaped and regulated. This invites a less optimistic evaluation of the possibilities for minor, short term 'events' and 'procedures' – independent of their 'democratic' appeals – to more fundamentally mitigate technological controversies.[182]

[182] It could also motivate a less optimistic stance on the prospect of exporting such procedures to other policy contexts as quick solution to acceptance problems in very different political and institutional cultures, as is currently often debated (e.g. Einsiedl et al. 2001, Liberatore 2001).

Chapter VI

The Problem of Inclusion – The British Case

As the focal point for the British case study I have chosen a procedure that can best be characterised as an *orchestrated public debate* on the commercialisation of GM crops and food in the UK with a participatory and deliberative intention and format. This debate, according to my impressions at the time of writing, had a more significant effect on the appropriation of the technology in Britain than many observers expected at its outset. It has, however, divided opinion in regard to the actual effects and especially the legitimacy of these effects, which makes it interesting for the present purpose. The debate was instigated by the British government, but run by an independent steering board appointed for the purpose. The 'public' phase of the debate took place during the months of June and July 2003 and was reported in September 2003.

Unlike a number of other participatory procedures this debate was structured and targeted to feed into a specific process of policy decision-making, but its organisers also intended it to be broad and open in its outreach. This produced a specific configuration of science, politics, and the public, which is interesting for the topic of this thesis for at least two reasons. It is a specific example of how a certain framing of and assumptions about 'the public' and their concerns, as well as the 'concerns' of the political system, are configured and develop a particular communicative structure that facilitates certain contributions and rules out others. Secondly, the challenges and obstacles the debate encountered as a particular mode of organised communication can, in my opinion, help shed light on some of the possibilities and limitations this type of procedure of public involvement in science and technology policy-making is likely to encounter.

This particular procedure was chosen because it is considered by most observers as a very significant (and path-breaking) attempt at instigating broader public engagement with science and technology in the British context.[183] As in the Danish case the inquiry will commence with a primarily descriptive section recounting of the context the procedures emerged in and was shaped by, the procedure itself and an attempt to retrace (some of) its effects. Subsequently, I will take a more analytical stance and discuss certain aspects of the case in the light of the theoretical reflections and operational questions developed in earlier chapters. In conclusion I shall take the opportunity to introduce a theme to which I shall

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[183] The organisers, on their web page, describe the debate as "an innovative, effective and deliberative programme, with the issues for debate framed by the public." See also the written evidence for the House of Commons (2003) comprising written submissions from a number of stakeholders' evaluations of the process. Incidentally, it so happened that the procedure took place during the work on this thesis, which provided a particular opportunity to observe a deliberative procedure 'in the making'.

also return in the comparative section, namely how mechanisms of inclusion and exclusion are used to establish the credibility of such exercises, what I call the *problem of inclusion.*

The Context

In order to set the scene for the description and analysis of the event, it is necessary to look at the context in which the debate came about. Some of this is obviously covered in the general section on the GM controversy as an example of late modern risk controversies. However, this case also has its specific history and dynamic. This, I will argue, must be located at the intersection of a number of different discourses and policy developments, the most important of which I shall try to disentangle and explicate in the following. The description will consist of four parts, which are separated for descriptive reasons, but are obviously interrelated. Subsequently, I hope to demonstrate how all these contextual elements flow into the shaping and flow of the debate as an event and help to interpret its specific features. The first of the contextual features is a longstanding debate in Britain among both academics and policy makers on the nature and importance of public understanding of science. The second pertains to the various effects on the relations between political decision-makers, the scientific establishment and the wider public following the policy failures in regard to BSE and to a lesser extent other problems in the UK food sector. Thirdly, I shall look at the emergence of a 'new mood for dialogue' in policy discourses as a response to the diagnosed lack of public trust in scientists and regulators. Finally, I draw a brief sketch of British policy on biotechnology and its organisational form to the present and describe the interaction between British, European and wider international developments.

The Public Understanding of Science Discourse in the UK

Britain has a longstanding reputation as one of the front runners in Europe in regard to biotechnological research and development, a position that goes back at least till the discovery by Watson and Crick in 1953 of the DNA structure. However, Britain has also witnessed some of the most thorough discussions on the effects of science as a cultural and economic force. Since the end of the Second World War at least academics and policy makers virtually everywhere have assumed that a strong (scientific) knowledge base is an indispensable prerequisite for industrial innovation and hence for a prosperous economy (See for, various perspectives, Martin and Nightingale 2000)).[184] Opinions vary on what is

[184] This 'linear model of innovation' (direct flow from basic to applied research to product innovation), epitomised in the report by Vannavar Bush 'Science, the Endless Frontier' (1946) underpinned much of US post war science and technology policy. However, subsequent research on innovation has cast serious doubts on the theory (Martin and Nightingale 2000). Nonetheless, it remains a strong implicit idea in many policy discussions. In this context this point is clearly expressed in a speech given by Tony Blair in April 2002, claiming among other things that: "The strength and creativity of our [the UK] science base is a key national asset as we move into the 21st century" (Blair 2002). The speech made a strong case for Britons and Europeans to embrace the possibilities offered by new biotechnology, and not "retreat into a culture of unreason".

the optimal mixture of basic research relative to applied R&D efforts for various economies and how the right balance between public and private funding of research activities across different sectors is best achieved. These discussions are often highly technical and have generally not attracted much public attention. However, a fundamental precondition for policy makers to be able to allocate resources as they believe desirable is that research activities, both basic and applied, are generally held to be both legitimate and desirable among the wider public. As a number of different technological controversies have shown, this precondition appears to have become increasingly fragile across the Western world[185] – and therefore the object of growing political attention. Where post war science and technology policy for a long time consisted almost exclusively in a nurturing of innovation and economic growth (paired with a paternalistic protection of public safety) such objectives must now increasingly be balanced with public acceptance of new technologies.[186] Britain has a long history of scientists who discuss both the cultural and the economic value of a scientifically literate population that could facilitate and legitimate scientific progress, technological innovation, and economic prosperity (Irwin and Wynne 1996, Martin and Nightingale 2000). Arguably, these debates have featured more forcefully in the British context than in my other cases and they have undoubtedly left more traces in policy discourses in Britain than elsewhere,[187] which is why they should be considered here – although aspects of this debate also has relevance beyond the British context. It is today widely accepted that many such considerations were rather elitist and framed as a question of how best to achieve and maintain a one-way educational effort flowing from scientists and engineers into 'society', whilst protecting scientific activity from interference from impure interests. These ideas were epitomised in more recent times by the publication in 1985 by the Royal Society of a report called 'Public Understanding of Science'. Here it was stated that:

> *"Science and technology plays a major role in most aspects of our daily lives both at home and at work. Our industry and thus our national prosperity depend upon them. Almost all public policies have scientific and technological implications. Everybody, therefore, needs some understanding of science, its accomplishments and its limitations."* (Royal Society 1985: 6)

A statement that construed a rather monolithic image of science and technology, of which 'everybody' ought to understand at least a little. Not (only) because it impinges on their

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[185] Durant (1999) likens this to the paradox of democracy described by Giddens: countries with well-established and working democracies exhibit low levels of enthusiasm about current politics and politicians – whereas people without or with fragile democracies generally want more democracy. According to Durant the same trend can be observed for science. Countries with the highest levels of science and technology also exhibit large degrees of public scepticism and mistrust in experts, whereas developing countries are much more optimistic and have fewer controversies.

[186] 'Paternalistic' in the sense that it was largely considered the task of a technocratic elite to determine the necessary level and appropriate means of public protection on the basis of expert knowledge.

[187] At least I have not come across similar references to debates about the science/society interface impinging on biotechnology debates in my other cases.

daily lives, but because national prosperity depends on it. The report describes scientific literacy and pro-science attitudes almost as civic duties. By implication, any 'problems' in the interaction between science and society was thereby placed squarely with 'society' or the public, not with problematic features of either scientific knowledge or the effects of its application in various technologies. Or, these were to be handled by policy makers on behalf of a trusting population.

The claimed public ignorance of science and technology – and the alleged hostility of the public towards science and science based policy-making – was posed both as a democratic and an economic problem which required urgent attention. Some years later, in 1992, an academic journal with the same title as the Royal Society's report was launched. Although this led to or coincided with broader international interest in such issues, the debates about public understandings of science appear to have been particularly influential in the UK (Elam and Bertilsson 2003).

The thrust of the Public Understanding of Science (PUS) discourse has been described as a

> *"... predominantly science-centred and science-led movement. It has emphasized the educational and 'civilizing role' science and scientists can play in the context of the new technological competition, and has framed its task as first of all one of combating public hostility and resistance to new technology."* (Elam and Bertilsson 2003: 239)

PUS as an academic topic has primarily been about public education, about creating a receptive audience for scientific communication beyond those of science's more traditional, limited audience of peers, rather than about 'science's understanding of the public', that is the attention of scientific organisations to the needs and concerns of the wider public.

At the heart of the discourses on PUS was the now rather infamous 'deficit model', whose basic assumption is that acceptance of technologies is directly correlated with knowledge of the underlying science. 'To know science is to love science', so to speak. The deficit model has largely – at least at the rhetorical level – fallen into disrepute in British policy discourse, not just through academic and popular critique but also by being proved inadequate in practice.[188] The PUS research programme has, however, produced both concepts, interpretive frameworks and empirical knowledge, which still influence discussions in the UK significantly. As epitomised in the sociological diagnosis of the emergence of a *risk society*, mishaps and controversies have shown that the effects of scientific knowledge production and technological development do not have only beneficial effects in society at large, nor are such effects distributed equally throughout society. This has forced science-based or-

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[188] As indicated by survey research, no clear correlation between scientific literacy and acceptance of technologies can be established (see Chapter I). However, there may be more structural reasons why the abandonment of the deficit model in practice is mostly rhetorical.

ganisations to alter their relationship with their surroundings.[189] In order to do this PUS researchers and other social scientists have been called in to 'assist' such organisations.[190] In dealing with 'new' problems – or new ways of dealing with old problems – some older framings of the interaction between science and the public are (re)activated. This is especially the case in discussions on how the public can be informed about, and what kind of information the public need, to be more actively involved in policy making.

Policy Failure, Intransparency and the Decline in Public Trust

It is believed by many commentators that the single most important, although not the sole reason for the changes in the discourses on science, technology and the public in Britain has been the BSE scandal. The BSE case is important not only because it demonstrated in practical terms and under enormous public attention that scientific knowledge is fallible and that scientific controversy – especially when it comes to regulatory science where decisions must be made in finite time[191] – easily gets entangled in a variety of non-scientific issues, interests and biases. It also demonstrated that organisations – also science-based ones – tend to stick to decisions long after they have ceased to be 'rational', i.e. that learning effects do not necessarily set in when new evidence emerges if these are contrary to organisational commitments. The BSE case furthermore made it clear that in a policy culture like the British one, described as 'informal, cooperative, and closed to all but a select inner circle of participants' (Jasanoff cited in Bauer et. al. 1998: 164), public confidence is very difficult to regain once such policy failures have been exposed.[192]

In the aftermath of the BSE crisis, British authorities had difficulties stabilising public expectations in food safety in order that the public's attention be directed towards other issues. They have in a sense lost discursive control, and food safety has remained a constant

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[189] By science-based organisations I mean organisations that in their self-descriptions operate primarily with the help of scientific theories and methodologies. This does not only include research organisations, but also regulatory agencies and companies that purport to apply 'science-' or 'evidence-based' procedures.

[190] This is also the case in the preparation of the debate to be analysed here, where the initial recommendation by the Agricultural and Environmental Biotechnology Committee (see below) stated that: "In order to discover what might satisfy the public, it would be useful to have a more systematic understanding of the basis of public responses to new technology. There is already a large body of existing research by social scientists and market researchers, but this is dispersed and fragmentary: an over-arching study distilling and integrating the various approaches would be invaluable. We see a need for a network of social researchers working in this field to create a continuing body of improved social intelligence, which the Government can use in decision-making" (AEBC 2001: 43). Following this quote, it does not seem necessary to mention that several social scientists serve on the committee. One may feel tempted to wonder, however, if this is not in fact to overstretch the expectations of what the social sciences can deliver, both due to epistemological difficulties with the predictability of the phenomena at hand and questions of disciplinary dispersion of perspectives.

[191] Which means that science's traditional social processes of quality control may be circumvented, both organisationally and temporally.

[192] The BSE case is of course also important as it serves as a symbolic 'anchor point' for a number of concerns in regard to modern industrialised food production, which are often aired in discussions about GM food as well as the regulatory framework surrounding GMOs (Grove-White et. al. 1997, see also Chapter I of this work).

'irritation' in public communication. Therefore, the proponents of GM technology have not been able to establish the image of this technology as a stable 'causal simplification' in public perceptions – surprises are expected and issues can (perpetually) be (re)politicised. In Luhmannian terms one can say that communicative complexity has not been reduced to the degree achieved in other technological domains.

However, the BSE debacle is not only invoked by opponents of GM crops as an example of how 'meddling with nature' can have unforeseen consequences and of how public bodies are unreliable. It is also at times used by those same public bodies as an example of how not to do things – accompanied by assurances that 'the lesson has been learned'[193].

A central example of such claimed policy learning was the establishment in 1999 of the Food Standards Agency (FSA), an independent regulatory agency combining risk identification, risk assessment and regulation as well as risk communication for all matters pertaining to food safety. The FSA works on a self-proclaimed basis of openness, transparency and consultation, putting consumer safety first. The establishment of a 'transparent' and 'independent' government agency with consumer safety (rather than industry success) at the top of its agenda was hoped to help rebuild public confidence in the regulatory oversight of the food sector, i.e. a return to a situation where consumers do not worry about the food they consume. The establishment of the FSA was proclaimed to be a major shift or innovation in the British policy culture. This meant that areas previously considered 'technical' and left to closed, self-recruiting expert bodies now were perceived to require transparency and social inclusion in order to command public confidence (Salter and Frewer 2003). However, such institutional innovation was not automatically propelled by the observation of public distrust following the BSE scandal. The idea that transparency and consultation could provide solutions to public distrust in the food chain did not come out of the blue.[194] Arguably, its intellectual underpinnings had been maturing for some time before it was adopted by central policy making institutions.

A New Mood for Consultation and Public Participation

Alongside the original strands of PUS in academia and among policy makers focusing on scientific literacy among the public, the acceptance of new technologies, and the authority of scientific expertise a growing 'reflexive' or 'critical' stream of PUS discussion on how to 'democratise' science and technology or make it more attentive to the needs and creeds of

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[193] An argument which, on the political scene, is helped by the change of government – as well as perhaps contributing to bringing this change of government about.

[194] This is of course not to argue that the BSE problems are the only reason for the establishment of the FSA or other institutional changes at the interface between scientific expertise, policy making and the public. However, in a number of policy documents the BSE debacle is presented as the prime example of how *not* to do things.

the public has also developed, which also questions the feasibility of a concept of 'a public' for science and technology at all (see e.g. Durant 1999).

This is a way of thinking about the interaction between science, technology and society, which has risen to some intellectual prominence internationally. In Britain, however, more explicitly than elsewhere, it seems to have had a direct influence on the rhetoric of the policy-making establishment. This in part happened through the appointment of some leading academics within the PUS research discipline to various advisory boards. This can be observed in a number of policy documents where both the Parliament and the Government present themselves as having won a new type of attentiveness to public concerns in regard to science and technology – and stage this 'new mood' for consultation and dialogue as the result of a learning process where old routines are being revised.

This is perhaps most clearly expressed in the 2000 report from the House of Lords' select committee on science and technology report entitled 'Science and Society'. This widely cited paper is often considered a landmark for the in British science and technology policy away from elitist educational approaches towards interaction with broader constituencies. The basic diagnosis of the report runs as follows:

> *"Society's relationship with science is in a critical phase.... On the one hand, there has never been a time when the issues involving science were more exciting, the public more interested, or the opportunities more apparent. On the other hand, public confidence in scientific advice to Government has been rocked by a series of events, culminating in the BSE fiasco; and many people are deeply uneasy about the huge opportunities presented by areas of science including biotechnology and information technology, which seem to be advancing far ahead of their awareness and assent. In turn, public unease, mistrust and occasional outright hostility are breeding a climate of deep anxiety among scientist themselves."* (House of Lords 2000: §1.1)

The report reviews a number of findings from the research on PUS and acceptance of technologies and concludes that the root of the problem has to do with a 'crisis of trust', a concept (trust), which the report admits it does not understand well (ibid: §2.36). A number of suggestions as to why this crisis of trust has emerged are debated in the report. A central one is that "(t)he administrative culture of the United Kingdom is notoriously secretive" (ibid: §2.45), another is that in practical matters scientific issues are mixed up with a number of other concerns of a more social, economic or ethical character:

> *"It is a difficult challenge to get this balance right: on the one hand to address the scientific questions seriously, but on the other hand to avoid reducing the whole public issue to one of science. A negative response to expert assertions on issues involving science may be mistaken as negative to science, when in reality people are responding negatively to the way in which this reduction to a "scientific issue" alone distorts or excludes other legitimate concerns."* (ibid: §2.49, emphasis in original)

The reports cites GMOs as just one example of this, stating that "(t)his is a political question of the balance of power between agribusiness, the small farmer and the consumer, not a scientific issue about the effects of GMOs on human health or the environment." (ibid:

2.50). So when 'science' gets blamed by the public, it is because no sufficiently clear distinction between science and non-science is maintained when political choices are dressed up or 'translated' into scientific issues – in short when politics is 'scientificated'.[195]

The report also includes a chapter on new ways of 'engaging' the public in issues of science and technology, which is both descriptive and prescriptive. Various formats for involving the public(s) that were then beginning and endorsed as something to be nurtured. It is concluded that "(t)he United Kingdom must change existing institutional terms of reference and procedures to open them up to more substantial influence and effective inputs from diverse groups" (ibid: Summary §18). There is allegedly no alternative to this as "...science as any other player in the public arena ignores public attitudes and values at its peril." (ibid: Summary §19).

This observed and proscribed 'new mood for dialogue' was taken up by the Parliamentary Office of Science and Technology (POST) in a 2001 report titled "Open Channels – Public dialogue in science and technology" where various formats of public dialogue and participation are described and evaluated for their applicability to various types of issues, and a number of guidelines and recommendations are given for public authorities that wish to pursue such activities. Here it is stated that participatory procedures and consultative exercises – if properly conducted – can serve both to support democracy and make better decisions (i.e. both normative and instrumental arguments are invoked). This report was followed by yet another publication – this time from the Government's Office of Science and Technology (OST) in collaboration with the UK research councils, called "Dialogue with the public: Practical Guidelines" (OST 2002). This indicates that the problem-definition of the 'Science and Society' report rippled through the political system, where attempts were made to gradually transform its analysis and abstract goals into practice.

It thus seems as if the analyses and vocabulary of the more critical PUS research tradition – much in line with the considerations on 'socially robust knowledge' and 'extended peer review' discussed in Chapter II – have been adapted by central (both legislative and executive) political institutions in Britain, at least on the rhetorical level. The relation 'science and society' is depicted as something, which both is and ought to be more interactive than in the traditional discourses on scientific literacy and public acceptance framed by the deficit model – and differently that it had hitherto been. However, two things must be kept in

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[195] In a more analytical vein it can therefore be argued that the *Science and Society* report can be seen as a central British institution's attempt to wrestle with the challenges raised by the dual process of a scientification of politics and a politicisation of science (Weingart 1999). The discourses on transparency and dialogue suggest that one way forward is to bring science 'closer' to the public in order to maintain the legitimacy of scientific activities (Elam and Bertilsson 2003). One may ask, however, if this will really make science less politically virulent, as 'transparency' seems to have the character of a horizon, always revering when 'approached' (Brown and Michael 2002). If some degree of trust does not already exist, transparency will only lead to information overload, a problem that cannot be solved through yet more transparency. Instead, organisations will have to stage themselves as 'authentic' (ibid.), i.e. as being sincere in their attempts to be responsive and therefore making the 'relevant' or 'essential' information available.

mind when assessing these developments. Firstly, authorities on the more operative level are complex organisations with many tasks and objectives to attend to. They might be recalcitrant to adapt externally decreed 'cultural' transformations if they see no immediate benefits from these, typically understood as their work being made less rather than more complex. This is perhaps especially the case if they have a strong 'scientific' ethos and self-understanding, i.e. they see themselves as operating on the basis of scientific rationality and evidence, which is considered superior to other types of knowledge. Therefore, secondly, it is by no means certain that such programmatic statements are reflected in the actual policy formations and day-to-day activities of public bodies (or scientific and technological organisations for that matter). This must be considered an empirical question, and will in part be examined in the case of one such organisation, the Agricultural and Environmental Biotechnology Commission (AEBC).[196]

The biotechnology sector and the regulation of food safety provides a good opportunity to study whether and how this *new mood* has had any substantial trenchancy beyond programmatic statements, and how it is actually implemented in practice.

Previous Public Participation in the Biotechnology Domain

Biotechnology also happens to be one of the areas where Britain has carried out many of its experiments with public participation in science and technology, both in terms of the direct involvement of lay citizens, and the (corporatist) involvement of stakeholders in policy-making. Two such instances are especially worth mentioning as the case to be analysed has been likened and contrasted to both.

The first ever UK consensus conference, designed after the Danish model, was held on biotechnology in 1994. It has been argued that the conference was not particularly successful (Purdue 1999, 1996). Several reasons are given for this. The conference was arranged by the Science Museum and it is claimed to be somewhat unclear whether the goal of the conference was to function as an educational event, as an experiment in participatory procedures or to provide actual policy recommendations (ibid.). The output of the conference did not really have an 'addressee' or well defined aim, which means that its effects on policy have been negligible (POST 2001: 10). That such conferences can potentially serve an 'early warning' function in regard to potential conflicts is, however, underlined by the fact that many of the themes and public concerns identified and addressed in the 1994 conference

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[196] This commission, which proposed and directed the public debate to be analysed cannot, however, necessarily be taken as representative for wider developments in the UK, as it was formed under the new 'regime' of transparency and consultation. As such, it of course recruits its members from different background and organisations with certain ways of doing and viewing things, and has a certain history. However, they are put together in a context where there are no in-built routine as such to break with. Therefore it can be expected that – all other things being equal – it is easier for such a committee to adhere to this *new mood for dialogue* than for existing organisations.

were still present in the debates in 2003 (ibid.). It seems that the idea of directly using deliberative inputs from citizens in policy-making found little resonance at the time.

However, the willingness of the political system to engage with the public gradually changed over time.[197] In 1998/99 the OST undertook a 'public consultation' on developments in the biosciences,[198] which included some participatory/deliberative events. These consisted of a number of workshops where lay people were invited to form and formulate opinions on various aspects of new biotechnological developments and their regulatory oversight as well as to articulate their concerns in regard to the emerging technologies. It has been critically noted that the participatory elements mostly served as pilot studies for a more traditional, non-interactive quantitative investigation of awareness and opinions among a representative sample (Irwin 2001). As stated by the minister for science:

> *"The consultation sets the challenging task of seeking the public's views and promoting informed debate. Our long-term aim is to encourage public confidence in the Government's use of scientific information and know-how. Understanding what people expect of Government and science is crucial to meeting their needs. I hope that the consultation will help focus the policy-making process..."*
> (Quoted in Irwin 2001: 8)

The aim of the consultation was, then, to inform the Government about knowledge and concerns present among the public, rather than to actually involve the public in policy-making. Therefore, a tension between the citizen-led and policy-informing intentions of the consultation has been noted as the political system sought to control the framing of the issues to be addressed (Irwin 2001: 9).[199] Nonetheless, the consultation's approach indicated the emergence of an awareness in the political system that 'the public's' frames and concerns are not necessarily identical to those of either the political or the scientific system and that this must be reflected and possibly acted on. Hence, although the activities of the exercise were criticised for being framed by the Government's quest for knowledge, which is shaped according to its own agendas, rather than by the concerns of the citizens involved, the exercise was taken to illustrate that 'ordinary people' were able to engage seriously and competently in complex scientific and regulatory issues, and hence as encouraging for more citizens' involvement in science and technology policy making.

The results of the consultation are claimed to have fed directly into the establishment of two new advisory bodies on biotechnology, one on human genetics and one on agricultural biotech (the AEBC) (OST 1999).

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[197] Perhaps especially after consumer pressure led leading retail chains to remove GM ingredients from their produces and used this for advertising purposes.

[198] Broadly defined to include both agricultural and medical applications

[199] Also, it is noticeable that although the aim of the consultation was to understand what the public expects of science (as well as Government use of it), this was to be mediated by the political system. No direct public-science interaction was mentioned.

As will be shown in the following all the discourses and experiences discussed in the previous pages contributed in one way or another to the procedure explored here. However, the intellectual underpinnings and discursive context of the debate form only part of the information necessary for its analysis. In order to get a grip on what the public debate was meant to contribute to (and to establish if it altered anything), I must also describe the regulatory and institutional context surrounding biotechnology in the UK.

The UK Regulatory Framework

Since the emergence of genetic based biotechnologies, Britain has been one of the front-runners in Europe, both with regard to investment in research and development and in terms of relatively unrestrictive policy making support for innovation. In this respect UK policies were for some time closer to US than other European models. The British policy style has been described as differing from other European countries in that: ... "UK science and technology policy-making generally favours a pragmatic, case-by-case approach. The tendency is to avoid detailed regulation in the first instance and to opt instead for flexible arrangements – often involving voluntary codes of practice in preference to formal statutes – that are capable of responding rapidly to subsequent developments. Biotechnology policy initiatives in the UK over the past 25 years have largely conformed to this style." (Bauer et al. 1998: 163, see also Salter and Frewer 2003). Up to around 1990 the UK regulatory framework was largely based on voluntary consultations between the scientific community, industry and regulatory authorities with few statutory restrictions on activities and little involvement of external stakeholders or non-technical perspectives (Bauer et al. 1998, Lewidow and Carr 1996). Generally, party political competition has had little influence on the regulation of biotechnology. Nor have there been any institutional avenues for the public to influence regulatory procedures.

The principal aim of the policies, until that point, was to stimulate biotech research development as a potential economic growth area, as little public or parliamentary attention was devoted to potential problems and risks in relation to biotechnology.[200] Regulation was *ad hoc* and based on a case-by-case evaluation within sector specific regulatory bodies, and no horizontal 'gene-laws' were created as in Denmark and Germany. However, once concerns began to emerge over a number of issues (unlike the US and similarly to a number of European countries) Britain opted for a 'process-based' regulation and from 1990 statutory regulation was enacted, which required prior consent for specific activities based on a 'precautionary approach'. At the time of the first EU directive on the deliberate release of GMOs (1990, implemented in Britain with some delay in 1993), the UK government established an expert Advisory Committee on Releases into the Environment (ACRE) as well as

[200] Only the health and safety of laboratory workers were addressed in statutory regulation, mainly because the labour unions showed an interest in the issue as part of a larger struggle for work place protection (Gottweis 1998).

an Advisory Committee on Novel Foods and Processes (ACNFP). The membership and range of expertise in these committees have gradually been expanded to accommodate growing public awareness and concerns regarding GMOs, including environmentalist and consumer representative members (Bauer et al.: 164). Although there was some attention to the GM issue among environmental NGOs, the regulatory framework managed to keep public controversy in the UK limited, and towards the middle of the 1990s moves were made towards relaxing statutory regulation. At the same time the UK was working to get the EU to adapt a more 'product-based' approval procedure, as the British industry argued it was overburdened with regulation and that biotechnology was unnecessarily stigmatised through the 'process based' regulatory framework (ibid.).

The drive towards deregulation was, however, markedly slowed down by the combined effects on the public of the outbreak of the BSE scandal in 1996, the controversy surrounding the arrival of Monsanto's GM soybeans on European markets (Lassen et. al. 2002) and the announcement of the cloning of Dolly the sheep, which in combination put the public safety, corporate motives and ethics of the new biotechnologies on the public agenda in the UK. From then on biotech policy changed from being primarily promotional to balancing technology promotion and public acceptance, and potential problematic aspects of new biotechnologies were placed higher both on the public agenda and in regulatory discourses.

Hence, since 1996 both European and British biotechnology policies (in the non-human area) have been increasingly preoccupied with human health, environmental safety and consumer acceptance. This concern with public health and public acceptance was further intensified after the 'Great GM Debate' as the media storm in early 1999 has been termed (Durant and Lindsey 2000). Here both tabloid and broadsheet newspapers campaigned against GM food on the basis that it was uncertain whether it was safe for human consumption and that the Government was being too lax about safety to please the biotech industry. This 'debate' was part of the reason why several leading retail chains removed GM food from their shelves and exerted pressure on their contractors to supply GM free produce. This development put the power of consumers on the agenda, and showed that major food retailers had become an independent factor to be reckoned with in the wider social regulation of food technologies.[201] In effect this meant two things. Firstly, a *de facto* dual governance regime evolved where consumers and retailers became as important in technology regulation as politically determined statutory regulation (Salter and Frewer 2003). Secondly, the political system had in effect lost discursive control over the framings of GMO risks and had to change from a mode of *control* to one of *negotiation* in its policy making (ibid).

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[201] Much to the dismay of parts of the industry, who argued that in this way consumers were actually deprived of choice rather than exercising it.

Although the UK government and regulatory agencies had grown increasingly attentive to public concerns, the UK, however, was not among the countries that imposed the EU moratorium in 1999. The UK was also one of the most ardent advocates for a return to an 'evidenced based' approval procedure within the EU comitology system.[202] This discrepancy between public attitudes and the standpoints of the British government was rooted in a number of factors. One was that central members of the Labour government, including Prime Minister Tony Blair, science minister Lord Sainsbury and agricultural minister Margaret Beckett were known as committed proponents of GM food.[203] The Government wished to protect and support the relatively strong standing of British biotech science and industry through as liberal a regulatory climate as politically possible. Part of the explanation was undoubtedly also the threat of a pending trade war with the US over the GM issue. Therefore, in the work on the revision of the EU directives on deliberate release, food safety and labelling, the UK presented a more technology and industry friendly stance than many other EU countries, favouring the case-by-case approach, which tones down the more programmatic aspects of the technological trajectory as an object of regulatory intervention. Although actual regulatory regimes never ascribe clearly to ideal types, comparatively the British approach arguably drifts towards the 'individualistic' pole in the cultural theoretical classificatory scheme outlined in Chapter III.

In order to both further the technology and bolster it against public opposition and concern, several policy initiatives were undertaken beyond the programmic statements on the 'new mood' for public dialogue described above. Three of these are especially worth mentioning.

The first is the establishment of the Food Standards Agency as a high profile, independent agency in charge of all matters pertaining to food safety as described earlier. The FSA has undertaken several initiatives to both inform and create debate about GM food, including a Citizens' Jury held in April 2003.[204]

Secondly, in 1999 the ministry of the environment initiated a large-scale program of field trials for several GM crops to assess their effects on biodiversity in 'realistic' circumstances, i.e. ordinary farm practices. This programme was accompanied by a voluntary agreement between the government and the organisation representing the agribiotech industry and seed companies that there would be no commercial growing of GM crops before the com-

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[202] I.e. one that does not take subjects other than risks to human health and the environment into consideration, and assumes that if no unacceptable risks (proportional to other food or environmental risks) are documented, no restrictions should be put on products for other reasons.

[203] As stated for instance in a speech in April 2002: "In GM crops, I can find no serious evidence of health risk." (Blair 2002).

[204] This Citizen's Jury was not only criticised by some observers for 'confusing' the public before the major debate was launched. GM critics also reproached the FSA for being biased in a pro-GM direction. This is for instance claimed to be the visible in the public announcement of the result of the Citizen's Jury, where the FSA was accused of distorting the outcome (S. Mayer, GeneWatch press release, May 9th 2003).

pletion and evaluation of the trials. Nevertheless, these field trials proved to be contentious and some were obstructed by GM opponents with significant media attention (Reed 2002). Furthermore, the Government was later criticised by the AEBC for overstating the scientific value of the trials in the public. The AEBC claimed that the impression was given that the trials would settle all significant scientific doubts standing in the way of a political decision, which it claimed the Government knew (or ought to know) was not the case (AEBC 2001). As such, the Government rhetoric surrounding the farm scale evaluations (FSEs) can according to the AEBC be seen as an example of the 'scientification' of politics the HOL 'Science and Society' report warned of.

Thirdly, at the beginning of 2000, following advice both from the Nuffield Council on Bioethics[205] and analysis following the public consultation on the biosciences, the Agricultural and Environmental Biotechnology Committee was formed as an independent advisory organ to the government. This committee has within its remit:

- "to advise the Government on the ethical and social implications arising from developments in biotechnology and on their public acceptability
- to consider the wider implications of the lessons to be learnt from individual cases requiring regulatory decision
- to make recommendations as to changes in the current structure of regulatory and advisory bodies." (AEBC 2001: 6)

This meant not only an extension of the advisory competence to deal with biotechnology, but also the separation of 'technical', statutory regulation in charge of safety assessments, approval procedures and so on,[206] and more strategic and public oriented advisory functions. The establishment of the AEBC can be seen an indication of the UK government's acceptance that the survival of agricultural biotechnology depended on more than its safety as regulated by the Government's scientists. On the one hand it indicated a recognition that public sensibilities require more systematic attention than the traditional and mass mediated channels of communication between Government and the electorate allows. On the other hand, it also allowed a continued screening off of the technical aspects of regulation from politicised interventions, i.e. the social inclusion of diverse interests was re-focused from technical expert bodies undertaking specific approval procedures to a strategic, non-technical body with an advisory function only. In effect it means a differentiation of communication about public concerns into specific, specialised organisational forums.

The committee was presented in several policy documents as one of the first official organs to embody the 'new mood' for public dialogue due to its composition and routines. Its

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[205] A charity with close ties to government, which functions as an unofficial advisory organ.

[206] These were dealt with by ACRE (Advisory Committee on Releases to the Environment), a technical expert body under the Department for Environment, food, and rural affairs (DEFRA)..

members were appointed to represent viewpoints both in favour of and sceptical towards agricultural biotechnology, and it works on the assumption that transparency and consultation yields better results than the simple application of the best available scientific expertise. The committee is therefore characterised by its composition from a broad range of expertise and can be seen as one attempt by the Government to deal with social controversy through social inclusion. As will be shown in the following this is not a strategy that comes without (political) risks. The work and recommendations of the AEBC forms the background of the 'GM Nation? The National Dialogue' analysed in more detail in the following.

To summarise the context of the work of the AEBC and its initiation of the public debate, one can say that the UK was in this period characterised by the aftermath of the BSE scandal, which had led to public scepticism towards GM food and low trust in regulatory authorities and their scientific advisors. Furthermore, the policy context was marked historically by a culture of intransparency and step-by-step adaptation, which was allegedly in the process of transforming into a more open and consultative one in order to regain the public confidence it was keenly aware of lacking. This was paired with a government, which for both ideological and economic reasons was relatively strongly in favour of biotechnology and an international context pressing in different directions.[207] In cultural theoretical terms the regulatory regime hence can be described as developing from a predominantly 'individualist' mode to one entailing more 'hierarchical' and 'egalitarian' traits (more precaution and surveillance and more participation) and a differentiation in the institutional locus of regulation.

The Decision to Have a Public Debate

The AEBC was set up in June 2000 following a Government review in 1999 that identified a need for more strategic advice on a number of issues relating to biotechnology, partly arising from the mismatch between the then regulatory principles and practices and public opinion (OST 1999). The committee does not have any regulatory remit, and serves only as a strategic advisory body. The composition of the committee includes a range of expertises and viewpoints on agricultural biotechnology. As such, it can be viewed as more socially inclusive and extensive in its knowledge base than most committees in the British policy making system.

The committee's first major output was a case study on the farm scale evaluations (FSE) initiated by the UK government in 1999, which the commission believed to be a good way

[207] The US in favour of a liberal approach to GMOs based on a principle of substantial equivalence, large parts of the European populations hesitant toward them, but the EU pushing for the reinstallment of standardised approval procedures

of getting to grips with some of the issues that had proven controversial in the public sphere. One of the major conclusions of that report was that:

> *"(t)he appropriate development of GM technology has suffered as a result of the lack of opportunity of serious debate about the full range of potential implications of GM agriculture, on the basis of clear understandings of what is involved, away from concern that has been promoted by campaigning elements of the media." (AEBC 2001: 12). The report goes on to argue that: "... the Government must now encourage comprehensive public discussion of the ecological and ethical – including socio-economic – issues which have arisen. Time is needed for people to overcome differences of language and explore the extent of their shared understandings, and above all there is a need to include those who have felt themselves to be excluded and hence to have no control over events."* (ibid.)

On that basis, the committee recommended that the Government should arrange for a more systematic public debate on the issues involved in the commercialisation of GM crops.[208]

In its response the Government accepted this recommendation and asked the AEBC for further advice on how to arrange such a debate and make the best use of its results. There was a clear perception common all my interviewees that the Government accepted the call for this kind of debate only very reluctantly. The Government had expected the AEBC to advise on public acceptance through its own expertise and minor investigations. However, the Government could hardly ignore such a clear recommendation from its own advisory body on such a contentious issue: "we recommended it to them and they didn't have much option" as one member of the AEBC explained.[209]

In its response and acceptance of a public debate, the Government also asked AEBC for advice on how to "determine the public acceptability of GM crops, in particular, cross-pollination thresholds and GM presence in organic crops". This can be seen as an indication that from the outset the Government and the AEBC had different perspectives on the debate. One might say that the Government wanted to probe the acceptability of its policies – which it knew could be controversial – as they already existed (opinions, acceptability), 'out there' in society.[210] The AEBC assumed that such opinions have a more processual character, and would only emerge in communicative processes. Therefore, the aim of the exercise for the AEBC was to let the general (interested) public explore these issues in a dialogical form, which was not necessarily linked to very specific issues such as pollination or threshold limits.

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[208] As in the Danish BioTIK initiative the importance of a shared language is stressed. However, no assumptions are made here about what 'kind' of language this should be, e.g. whether 'ethics' should have a privileged status.

[209] R. Grove-White in interview.

[210] As such, the approach resembles the more generic public consultation on developments in the biosciences undertaken a few years earlier.

The AEBC then drafted a suggestion for such a debate, which it held to be "imaginative but also practicable and that offers value for money" (AEBC 2002). The Government's wishes were incorporated, as it was stated that "(t)he principal objective of stimulating a public debate, therefore, is to assess the nature and spectrum of the public's views on the possible commercialisation of GM crops in the United Kingdom and any conditions under which commercialisation might or might not acceptably proceed so that the public's view can inform decision-making." (ibid.) It was noted that an 'inevitable' outcome of the debate would be a better informed public, and it was also stressed that the debate should not act as a quasi-referendum. Furthermore, it was believed that the debate would serve as an important example of public participation in the discussion of scientific issues.[211] Here the plans for the debate clearly linked up with the programmatic statements of the political system to establish more interaction between science and society.

As the neutrality of the process was believed to be essential for the legitimacy of the output, the commission suggested that the debate should be arranged by an independent committee at 'arm's length' from Government. However, it was stated to be essential that the Government committed itself to the debate and stated clearly what it expected from it, as well as how it intended to use the output. This reflected the experiences that earlier exercises in public involvement, such as the 1994 consensus conference and the 1998/99 public consultation described above were seen as either lacking a clear policy aim or as being too rigidly tailored to Government purposes to allow the public to deliberate on its own terms.

A central element of the suggested debate was that the topics to be debated were to be framed by 'the public' itself. This was to be achieved through the use of focus groups to formulate "...terms which are likely to be widely recognised by other members of the public". Furthermore, a core aim of the exercise was to "reach people who have not expressed a view". Therefore, the focus should be moved away from established groups to the 'grass roots level', which should form the main target, a goal based on the assumption or suspicion that the GM sceptic environmental and consumer NGOs did not represent the 'real' public.

It is interesting to note that although the recommendations of the AEBC were directed to the Government, the House of Commons select committee on Environment, Food and Rural Affairs also commented on the suggestion. This shows that the debate was observed from other parts of the political system from its very inception, not only because of its potential direct influence on specific policies, but also because it could herald a new way of policy making on science and technology issues more generally. The committee generally endorsed the suggestion of holding a public debate, but was somewhat reticent about its

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[211] To that end, it was deemed desirable that social scientists were involved to "incorporate the most informed academic understanding of the possible significance and meanings of the views that emerge." (AEBC 2002).

potential ability to engage a 'wider' audience, rather than just letting the established actors reiterate their polarized views. Therefore, the committee expressed concern that the debate would not lead to anything resembling a consensus or convergence of viewpoints. The committee explicitly saw the merit of the dialogue in its potential to make the public better informed on the issues surrounding GMOs "in a rational and intelligent way". This focus on the 'rational' was further strengthened by the fact that the committee "urge(s) those in favour of GM crops and those opposed to approach debate on the subject in as responsible and open-minded a manner as possible. In particular we urge them to base their arguments on rigorous science, rather than conjecture." (House of Commons 2002) The committee thus expressed the hope that the conflict over GMOs could be de-politicised or de-fundamentalised through science. As it clearly saw at least part of the controversy as rooted in a sensationalist press, the committee also urged the media to approach the topics at hand in a 'responsible' and 'rational and constructive' manner. Here some reminiscence of the deficit model can be detected, as a significant cause of the virulence of the GM issue is ascribed to an uninformed and misled public, whereas science and rationality is depicted as unitary and authoritative.

It also indicates that the political system was keenly aware of some of the challenges participatory procedures may be exposed to, such as capture by vocal groups, factual confusion or misunderstanding, non-dialogical interventions etc., as well as the irritations they can cause in the political process. Both Government and the parliamentary committee therefore ensured they were not tied to the outcome in any substantial sense (e.g. in the statement that the debate should not acquire the status of a semi-referendum). Both the executive and the legislative sought to create in advance a communicative flexibility allowing them to move in ways, which would not be bound by 'public opinion'.

Despite some of these concerns and reservations, the UK government largely accepted the suggestions put forward by AEBC, and by the end of July 2002 the environment secretary announced that a public debate would be conducted under the direction of an independent steering committee led by the chair of the AEBC. However, it was announced at the same time that in addition to the format suggested by the AEBC, the programme for the 'National Dialogue' as the project was temporarily named would consist of two additional strands, namely a review of a broad range of scientific issues relating to GMOs and an economic study of the over-all costs and benefits of introducing or not introducing GM crops on a commercial basis in the UK. The scientific review was to be run by the Governments chief scientific advisor in collaboration with the chief scientific advisor of DEFRA[212] and the economic study was to be undertaken by the Cabinet Office's Strategy Unit. The Government stated that there was to be a "throughout ... two-way interaction between the

[212] Department of Food, Environment and Rural Affairs – the government department responsible for administering the regulation of agricultural biotechnology in the UK.

three components. Outputs from both the science and economics components will feed into the public debate. Equally, issues emerging from the public debate would help frame the direction of the technical work." (Government's reply to AEBC, July 2002.) This should allegedly encourage "... a dialogue between all strands of opinion on GM issues, in the light of the fullest available factual information." (ibid). It is unclear – even to people central in the work – how the three strand model came about. It seems to have emerged in intra-governmental discussions of the AEBC proposal. One observer suggested that it evolved as a combination of political strategy and the contentment of institutional interests.[213] The AEBC wanted a public debate, but the pro-GM government wanted to make sure that the science was properly presented to the public (a remnant of the deficit model) and ensure that DEFRA did not get disconnected from the process despite its being conducted at 'arms length' from the Government. It was also clear that some of the strong arguments in favour of GM crops – such as the combating of nutritional deficiencies in the third world – would be unlikely to emerge in either the scientific review or the public debate with any force. An economic study could address such issues legitimately, as well as the consequences for the British biotech and agricultural industries. By letting the Strategy Unit undertake the study the Cabinet Office could also be securely linked to the process.

For the members of the AEBC – and in particular those more sceptical about the benefits of GMOs – it was hard not to see this 'expansion' of the suggested debate as a means to counterbalance concerns within the Government that public concerns (which the Government perceived as unfounded, anxious, and emotional) could override the fact that there was at the time little scientific evidence of the risks related to GMOs, as well as the argument that potential economic benefits could be endangered. There were therefore "long and agonising" discussions within the AEBC about whether to accept the terms for the debate as proposed by the Government. However, the members agreed that having the debate was so important that they ought to proceed.[214]

The genesis of the three-stranded structure can in this interpretation best be seen as a process of the mutual accommodation of various institutional interests and political objectives, rather than the effectuation of an overall plan. As I shall show, this led to a situation where, apart from the very programmatic statements by the minister responsible that the three strands should cross-fertilise one another, it was unclear who was supposed to report to whom about what. There was no clear model for how the interaction was to take place,[215] which in effect meant that very little managed to take place.

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[213] Interview with A. Stirling, 20.08.03.

[214] Interview with R. Grove-White.

[215] In the case of the science review panel, even the appointment procedure was intransparent, both in terms of procedures and criteria for membership. Appointments were made by DEFRA, but the ABC (Agricultural Biotechnology Council, industry organisation) and certain environmental organisations were invited to sug-

The public debate strand was initially granted a budget of £250.000 and the AEBC was given until the end of June 2003 to report the results of the debate. In the following the primary focus will be on this strand. Subsequently I shall have more to say about the interaction with the other strands.

The Run Up to the Debate

After the Government decided to endorse and finance the debate a number of preparations were undertaken before its actual launch. A steering board was appointed by the chair of the AEBC to oversee the process.[216] Some of the issues encountered by this board and the ways they were dealt with are quite informative for understanding of the final format of the debate and its political effects. I shall therefore take a closer look at some of them. The following observations are based on material available on the debate's official website, in particular the minutes of the steering board's (henceforth: 'the board') meetings, and press material combined with interviews with three members of the steering board,[217] the board's secretary[218] and one member of the scientific review panel.[219]

From the outset the board was keenly aware that public confidence in the Government in this area was low.[220] Therefore, one of the first things the board had to deal with was its own credibility in the eyes of the public,[221] in effect to prove that it was truly independent

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gest experts they thought would be sympathetic to their viewpoints in order to secure a composition, which would presumably be competent and credible in the eyes of the public.

[216] The AEBC, as well as the steering committee of the debate, was chaired by professor of land economy and then pro-vice chancellor of Cambridge University, Malcolm Grant. He appointed the committee of ten members, which was broadly inclusive both in terms of social representation and competencies although none were officially appointed as representatives of any other organisation, all serving in their 'personal capacities'.

[217] These were:

Robin Grove-White, professor of Environment and Society, Lancaster University and former chair of the board of Greenpeace, UK. Interviewed July 14th 2003.

Gary Kass, advisor at the Parliamentary Office of Science and Technology. Interviewed July 15th 2003.

Clare Deveraux, Director of Five Year Freeze, an umbrella organisation of NGOs working for a moratorium on GM crops. Interviewed July 15th 2003.

[218] Richard Able, civil servant, secretary of the AEBC and the steering board. Interviewed Oct. 5th, 2003.

[219] Dr Andrew Stirling, research fellow at Science and Policy Research Unit, University of Sussex. Interviewed on August 20th 2003.

[220] In the theoretical language suggested in Chapter III it can be said that the board as an organisation considered itself likely to be observed and communicated about in the 'medium' of public opinion – in a manner which might interfere with its work in a negative manner.

[221] Independency became an issue almost immediately upon the commencement of the board, as it became clear that most of the practical work needed to be commissioned to the Central Office for Information (COI), the Government's communications office, as primary contractor. This choice was deemed necessary in order to avoid time consuming competitive tenderings for the work. This was criticised by some observers as being too close to Government. However, according to several members of the board the 'real' problem with using the COI was not its independence, but their competencies and more fundamentally their culture. It was their experience that the COI did not understand what kind of processes the board wished to have

and not acting simply to promote or create acceptance of the Governments policies. However, it also needed to convince the Government – which was not too keen on the debate in the first place – that it could deliver a meaningful and worthwhile result.

One of the first tasks of the board was to formulate in more detail the objectives of the whole exercise. This process and its outcomes are interesting as it allows the perception of the GM controversies and the public's role in them, which underpinned the organisation of the debate, to be looked into more closely. It is telling for instance that a central topic of controversy within the board was whether the objective should be formulated as the undertaking an 'informed' debate. At first this may seem an odd issue to debate. Obviously, the point of the critics of the phrase 'informed debate' was not that there should be an 'uninformed' debate. It was to avoid what they perceived to be a patronising agenda, as "'informed' can be a very loaded term – a surrogate for telling people what is true."[222] The aim of (at least some of) the board members was to create a situation where technical expertise would not be given a privileged argumentative position, and where critical issues could also be explored by lay people. In the final wording of the objectives a compromise was found in the formulation that the debate should seek to "enable (through dialogue with experts and other activities) **access to the evidence** and other balanced and substantiated information the public may want and need to debate the issues" (emphasis in original). This formulation underscores the intention that scientific (and other) knowledge should be accessible to the participants in the debate, but at their own request and selection, not via a top-down process of feeding information.

Other formulations of the objectives of the debate also warrant attention. One is closely linked to the above, as it claims that the debate should "allow the **public to frame the issues** for debate so that the programme of debate focuses on what the public sees as the relevant issues" (emphasis in original). Practically this framing was undertaken by a market research company which undertook nine 'Foundation Discussion Workshops'.[223] The analysis of the discussions in these workshops was then applied to the creation of the discussion material that was later disseminated and the 'frames' and questions distilled from the workshops were passed on to the economic study and the science review panel so that they could proceed to address 'public concerns' on that basis.

A third issue transpiring from the formulation of the objectives of the debate was that it should seek to "**focus on getting people at the grass roots** level whose voice has not yet been heard **to participate** in the programme" (emphasis in original). It is explicitly stated

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established. In the eyes of the board the COI perceived of the assignment as one of their typical tasks: dissemination of information, which missed the allegedly more innovative and deliberative expectations of the board.

[222] R. Grove-White in interview.

[223] Which have the format normally known as focus groups, but which the board insisted on not calling focus groups as they should be more participatory and open.

that "people who have expressed their views will not be excluded from participation, but neither will they be specifically targeted and will not be allowed to steer events in the programme of debate". This is clearly intended for the more vocal campaigners, in principle both those in favour of but perhaps primarily against GM crops, and constructed an image on the one hand of communication in the public sphere until the debate as (too) uncompromisingly divided and on the other hand a majority of 'ordinary people' who had not been heard because there was no space for more moderate voices. Ordinary people were depicted as those 'caught' between the static viewpoints of organisations lobbying either for or against GM crops, who nonetheless ought both to be enabled to form a considered opinion and to have a say if they should so desire. In order to mobilise such people to participate it was perceived as necessary to curb the dominance of 'the usual suspects' in the debates over GMOs.

As such the opinions and evaluations of ordinary people were framed as more authentic, presumably more 'fair' towards the technology, and more valuable for political decision makers than those of organised actors, which were (implicitly) framed as self-serving and not prone to learning in deliberative procedures. This viewpoint is put particularly poignantly by Lord Robert May[224] in his claim that: "(t)hose who are only interested in portraying GM technology as either inherently dangerous or entirely problem-free will be left on the margins, alone with their ideologies and vested interests, whilst everybody else engages in informed discussion about how we might use GM technology to create the kind of world we want" (quoted in The Guardian, Feb. 11, 2003). In this respect an assumption was invoked to justify the public consultation procedure in that (some of) the organised actors normally giving their opinions and claiming to speak in the interest of the general public were not in fact representative of the wider public, and hence distorted rather than enabled rational and democratic debate on the issues. In this call for 'ordinary people' to participate, so-called ideological commitments and vested interests were disqualified from participating. The objectives stated instead that the debate should help to "**calibrate the views of organisations** who have already made their views known by contrasting their views with other participants in the debate" (emphasis in original). This can be interpreted as a call on organised interests to modify their positions where not aligned with those of the general public, as they were envisioned to emerge from the debate. Organised interests should be aligned with authentic public opinion in order for them to be considered legitimate actors in the debate.[225] Although the Government had made it clear that the debate should not

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[224] Chair of the Royal Society (UK academy of science) and significantly involved in the debate and other activities to promote interaction between science and society.

[225] It can of course be argued that since it is unlikely that there will be *one* public opinion on this topic a multitude of voices will still be required in the public sphere. However, it does seem that the image of a reasonable public opinion was suggested to be able to tame some of the more fierce standpoints among activists.

function as a referendum, issues and images of 'representativeness' were invoked with, it seems, the intention of preventing certain actors from taking control of the agenda.

Involvement with participatory procedures is not risk free for organised actors, and it can be expected that actors will develop strategies to ensure that they need not be wedded argumentatively to outcomes if these are unfavourable to their interests. This was seen as a number of environmental NGOs expressed concerns about the procedure in advance of its commencement, just as the Government was less than fully committed in the eyes of the board. The NGO community was sceptical towards both the meaningfulness of the exercise as such as well as the set up and procedures involved. They claimed that it was either unclear what import the output was going to have, since the Government was not properly committed to the debate, or that the whole event was a public relations exercise as decisions were taken at the EU level anyway.[226] Thirdly, some argued that there was too little time for a genuine debate. This was further exacerbated by the fact that the debate was to close before the results of the Farm Scale Evaluations, which were claimed to contain knowledge crucial to the decision-making, had been analysed.[227]

This indicates that the debate was arranged in a situation where both NGOs and the political system (the Government) were uncertain about what they could expect to emerge from the debate.[228] Therefore they devised strategies to ensure they would not be committed too strongly to the outcomes should these turn out to be unfavourable to their respective viewpoints. As such, political uncertainties were dealt with by means of a 'wait and see' strategy of non-commitment. It was at the time a 'public secret' that the Government was quite keen on promoting GM crops commercially, but publicly it reiterated the statement that no decision had been made. This led to some irritation within the board.

During the preparation of the debate the commitment of the Government to the outcome was a recurring theme. The initial attitude of the board, which was reinforced by preparatory research on other experiences with public participation or consultations commissioned by the board, was that it was important that the Government clearly signalled what it saw the purpose of the debate to be, and how it intended to apply the outcomes (e.g. Minutes 07.11.02 §14, 20.11.02 §21-22). Therefore, the board on several occasions challenged the responsible ministers to make clear statements on the issue. A first response formulated by

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[226] Which an unnamed Government minister was, at one point, quoted as having said (Quoted by newspaper commentator G. Monbiot in The Guardian, June 10, 2003).

[227] Initially the debate was intended to include the results, but as their publications got delayed, and the preparation of the public debate had progressed so far, the board did not consider it feasible to change the schedule (GM Nation report §23).

[228] The business sector organisations, it seems, kept a relatively low profile in the public sphere during the preparatory phase, presumably to avoid accusations of manipulation, and showed willingness to engage with 'the public'. In any case, at the time the business organisations expected to have the Government 'on their side'.

the cabinet minister responsible for Environment, Food and Rural affairs, Margaret Beckett, dated 7 November 2002, ran as follows:

> *"It might be helpful, finally, if I set out how Government sees the role of the debate in decision-making on the possible application of GM technology in this country. Over the coming years we will face decisions on a range of GM issues, not just crops. There are established criteria, enshrined in EU and UK legislation, which will provide a basis for the future decision making process. The starting point is that decisions are based on the scientific evidence as to whether there is a risk to human health or the environment. It is, however, important that these decisions are taken in the context of a full understanding amongst the public of their implications. The debate could be invaluable in this respect as well as in informing the government's approach to decision-making, and our view of the overall framework in which decisions are taken. We will listen, and learn, from the views emerging from the debate."*

This unspecific reply on how the outcomes would be applied consisting of a reiteration of the principle of science based decision making was not enough to convince the board as a whole that they could establish a process, sufficiently credible and important to mobilise wider sections of the public to participate. The chair therefore challenged the Government to state more clearly how the outcomes would be applied.

In a second response the minister promised that the Government would produce a written response to the report of the debate and "indicate what the UK Government has learned from the debate when making future announcements on GM issues" (Letter from Beckett to steering board 20.01.03).

This was accepted by the board and settled the issue for a while, especially as the commitment to respond to the outcome was accompanied by the additional funding and time the board had requested to be able to arrange a debate, which was both 'narrow and deep' and 'broad and public' (see below). However, shortly after, it emerged in the press that the UK Government had – following new EU directives – reassumed the scientific assessments in approval procedures for a total of 19 different GM crops. This raised new concerns in the board and among environmental NGOs that the debate was perceived by the Government as a mere PR exercise, and would have little or no effect on policy. The board therefore asked the minister to explain how the Government saw the relation between the outcome of the debate and the pending approval procedure, as: "(t)he public may wonder however why Government is participating in approval processes while the programme of GM debate activities is underway. They may think that if the approvals process seems to be carrying on regardless, it undermines the credibility of calling for a debate" (letter from M. Grant, chair of the board, to M. Beckett, 18.03.03). This concern was shared by some of the NGOs campaigning against GMOs, such as GeneWatch, whose director claimed more boldly that "If the Government allows these GM crops to be approved before the public debate ends it will be a slap in the face for democracy" (GeneWatch press release 03.03.03).

In her response the minister claimed that the government remained committed to the debate and that "[n]o decisions have yet been taken in the UK on the commercial cultivation of genetically modified crops, including those being grown in the crop trials" (letter from M. Beckett to board, 24.03.03). However, she explained that under EU legislation the UK Government was obliged to assess applications addressed to British authorities as competent, and if they do not comment on applications handed in elsewhere within the given timeframe, this would be taken as sign of consent. The minister furthermore claimed that it was unlikely that any decision would be taken at the EU level before both the Farm Scale Evaluations and the public debate had been evaluated. She reiterated the claim that if risks to human health or the environment were identified from any GM crop, it would be halted. However, in a telling passage she also stated that "The Government shares the European Commission's view that the EU moratorium is illegal, and we have long supported a return to evidence-based decision making in the EU" – a discreet way of saying that ethical or socio-economic reservations, which were likely to emerge in the debate, would be given little room in specific approval procedures.[229] Furthermore, it emerged that agreement within the Government was not unanimous, as the (non-cabinet) minister for the environment, Michael Meacher – known for his scepticism of GM food for and giving more leeway to environmental NGOs in policy-making – declared shortly before the launch of the debate that the UK could not prevent the EU licensing of commercial growth if no risks were documented (quoted in The Guardian, May 20, 2003).[230] He thereby implicitly acknowledged that the effects of the debate would be negligible if they were at odds with scientific tests.

At the time the debate went into its public stage the topic of a Government that was not really committed to the results was raised in the press, both by NGO representatives and commentators.[231]

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[229] This, for instance, contrasts sharply with a joint statement by twelve aid, consumer, environment, farming and trade union organisations, stating as key points in the debate about whether to commercialise GM crops. Here, the claim that "Biotechnology companies will gain the most from GM food" is point number one in their press release. Organisations include Greenpeace, GeneWatch, Soil Association (press release at http://www.genewatch.org/Press%20Releases/Attachments/GM_Debate_JOINT_NGO_STATEMENT.rtf)

[230] In a later reshuffle of the Government, Meacher was replaced as environmental secretary and became a more outspoken critic both of the quality of the scientific knowledge about the safety of GM crops and food and of Government politics in this area. It seems that Meacher was in fact sacked primarily because of disagreement with the cabinet about GM issues.

[231] For instance: G. Monbiot writes on June 10 in The Guardian that "...it [the Government] now seeks to revive ... confidence, by claiming – rather too late – that it is open to persuasion. Again, the decision to introduce the crops to Britain appears to have been made long before the debate began ... In March, Margerett Becket began the licensing process for 18 applications to grow or import commercial quantities of GM crops in Britain. Her action pre-empts the debate, pre-empts the field trials designed to determine whether or not the crops are safe to grow here, and pre-empts the only real decision which count: namely those made by the EU and the World Trade Organisation."

The impression of a government not completely committed to the debate's outcome was at the same time mirrored by a public that did not seem as enthusiastic to participate as hoped.[232] Critical observers ascribed this not only to the lack of Government commitment on taking the outcomes into proper consideration, but also to budgetary strains, which allowed for practically no advertising of the event.

The budget was a perpetual issue in the work of the board. The board was originally provided with £250.000, which was subsequently raised to £500.000 as it was otherwise deemed impossible to organise a debate, which was both 'narrow and deep' and 'wide and public'. The demand that the debate should be 'narrow and deep' as well as 'wide and public' expressed the perception that on the one hand a consensus conference style format of public participation was not considered representative, nor legitimate enough to address the GM controversy. Such a format could not allow for a process where everybody who wanted to could participate. Nor could it fulfil the function of public education as hoped for by some actors. On the other hand, the steering board clearly wanted an arrangement, which could achieve social learning effects that were not possible with traditional survey methodologies. This desire for a more interactive format also sat well with the Government's demand that the debate should not take the form of a quasi-referendum – the outcomes could not be too quantitative or representative in nature.

The board members interviewed unanimously describes the budgetary issue as a major reason for which the debate did not create as much public resonance as, in their opinion, could have been achieved with more time and initial clarity of the available resources. They claim that the board was very keen on making the debate happen and actually considered a collective resignation if the sufficient funding was not provided to undertake what they considered to be a reliable process. They all describe the board's insistence on wanting more time and money – and getting it – as crucial to the fact that the debate took place.

Although the additional funding was provided, board members felt that much time was lost both in the struggle to secure the funds and in planning under uncertain budgetary constraints. Many of these problems were ascribed to the executing organisation, the COI, which the board members described as not understanding the nature of what the board wanted to achieve. As one member expresses it: "We were an informed client, but we didn't have an informed contractor. For a steering board we had to do an awful lot of rowing."[233]

On June 2nd (the day before the debate's start) The Independent ran the debate as its front-page story and opened with the following words: "It's obscure. It's small scale. It has been starved of funds. It has not been nationally advertised. In fact, it hasn't been advertised at all. You could be forgiven for thinking the Government doesn't want you to know about it".

[232] The headline of the Guardian's coverage of the opening of the debate is telling: "The man in the street gets his forum on GM food – but decides to stay in the street." (The Guardian, June 4).

[233] Gary Kass in interview.

As an external sociological observer one should of course keep in mind that such an ascription of blame to external factors may be a way of justifying lack of success.[234] However, the frustration experienced by all actors involved indicate that the organisation of such a procedure – which was seen as a political experiment – entails a significant amount of social and organisational learning that can be 'painful' for all organisations involved.

In order to remain within the financial frames given, however, the board had to prioritise between a number of suggested activities. The final format was one where six regional conferences (called launch meetings) were arranged by the COI, around 40 meetings hosted by local authorities (county councils, etc) and finally a 'debate tool kit', including feedback questionnaires, was prepared for anyone who wished to arrange their own meetings. The issues to be addressed were 'distilled' from the 'Foundational Discussion Workshops' and framed as a number of for and against positions on a number of issues presented on the debate's web page, on a CD ROM in the debate tool kit and in a booklet handed out at meetings.[235] This was paralleled by a number of reconvened, non-public focus groups with recruited members of the public (i.e. people who did not participate of their own accord) to act as a 'control function' on the representativeness of the open debate meetings.

A final feature of the public debate that warrants attention is its relation to the two other strands of the overall debate framework, the science review and the economic study. In the minutes of the board's work and elsewhere it is repeatedly claimed that the results from the foundation discussion workshops were used to structure the scientific review and the economic study. These claims may, however, serve an integrative function rather than be accurate descriptions of the actual process.

When queried about their impressions of the interaction between the three strands the board members gave slightly differing accounts. However, they do agree that their dealings with the economic study were more intensive and fruitful than with the science review. It appears that all three strands had to go through learning processes to establish interaction. As one member explained it: "Both the other strands started off with fixed ideas of what the issues to be dealt with were. We (the board) started out assuming we did not know what the issues were for the public."[236] Eventually, however, the two expert strands were, to differing degrees, adapted to the framings of public concerns that emerged from the foundational workshops. As it turned out, the scientific review panel's report was structured around topics generated – in part – through public concerns as they emerged from

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[234] The boards member I interview all claimed that it was a bigger challenge to make the COI understand and deliver what the board wanted than to reach agreement within the board itself.

[235] As different viewpoints on GM crops were represented within the board the nature and content of this material was of course a contested issue. However, in retrospect the interviewed board members felt it more problematic that they were 'led astray' and spend 'agonising' amounts of time on developing a CD ROM, which they perceived to be a 'technological fix' proposed by the COI that had little understanding of the kind of dialogue the board wanted to promote.

[236] Interview with Gary Kass.

the workshops. These concerns were then 'responded to' with scientific arguments and assessments of the uncertainties of the science involved. The review was, however, a review of existing research,[237] and it would be an overstatement to say that the public concerns generated their own research agendas. In effect this means that the questions were applied to (re)order existing knowledge, but there was little 'interaction' between the actual public debate and the work of the scientists. The report from the scientific review panel only came out after the end of the public debate.

The board saw the group undertaking the economic impact study as more attentive to the board's interventions. In turn the study adapted a scenario based approach where public acceptance and hence market demands and liability issues were chosen as key elements in modelling the potential benefits and costs of a commercialisation of GM crops in Britain. The results of this work, however, also only came out when the public debate was practically over.

The Debate Process

When the debate was launched, it was given a three-tier structure. It was initiated through six regional meetings around the country arranged and run by the COI with a moderator. The second level consisted in calls on local authorities to host meetings at county level. Approximately 40 such meetings were held. Finally, the organisers of the debate called upon everyone with an interest in the topic to arrange their own meetings. Members of the steering board expressed dismay in advance with the short timeframe within which these meetings were to be held, as they did not feel this would give enough time to mobilise the desired level of activity among local networks and organisations. Both board members and others expressed their criticism that the debate was to end very shortly after the results of the economic impact study were published, and before the results of the scientific review were even known. Nonetheless, the total number of meetings held grew to around 675, with an estimated 20.000 participants (GM Nation report §82). These were arranged by a variety of organisations like city councils, local branches of environmental organisations or church parish councils. In addition to this more than 36.000 responses (questionnaires) were received.

The intention of the steering board was to achieve a format that was different from – more engaging and deliberative – than traditional public meetings, which typically involve staged confrontations between two viewpoints. The format selected for the first six regional meetings was the following. First a short introduction to the event and the issues to be dis-

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[237] One GM-sceptic scientist left the review panel before its work was completed and publicly argued that he considered it to be biased in a pro-GM direction. One of the arguments he gave was that just studying peer-reviewed research could not provide a reliable picture of the uncertainties involved as: "Side effects would be viewed as negative results and scientists tend not to publish those." (Professor of ecological agriculture Carlo Leifert, interviewed in The Guardian, July 24th 2003)

cussed was given by the moderator. Then the participants gathered in small groups (typically 8 to 12 persons) to discuss for approximately one hour. The groups were encouraged to focus their discussion around some questions laid out on the tables, but were obviously free to take up other issues as well. The themes to be discussed were gathered under three main headings: what benefits were seen to arise from GM crops; what risks and impacts were seen; and what the opinion of the group was on whether GM crops should be introduced or not. The tables were encouraged to select a spokesperson, who would then present the main points of the discussion and its conclusions to the plenary. No general conclusions from the meetings were drawn, but the presentations from all tables were recorded and transcribed. At the end the participants were asked to fill out a questionnaire with 13 multiple-choice questions on their views on GM crops, some questions about themselves and their involvement with the debate and fields allowing more open-ended remarks.

In the discussion kit prepared by the organisers it was suggested that the second and third tier meetings be given the same general format, with small group discussions followed by presentations of the main points discussed. It is not possible here to judge to what extent this template was followed. Some meetings had different people giving presentations, in a number of cases two speakers arguing for and against GM crops respectively.[238]

Obviously, the description of the formal framing of the debate says little about the dynamics achieved in the discussion. However, as the debate took place during work on this thesis, it was possible to make observations 'on the ground' at two different meetings.[239]

Impressions from Meetings

At the beginning of both the observed meetings a quick show of hands was made to get an idea of the distribution of viewpoints on the GM issue. At the launch meeting in particular it was clear that the meetings were attended by many people with established views on the issues, whether for or against. It also seemed that in both instances the majority of the participants were negative towards GM crops.[240] Although the participants described themselves as 'ordinary' or 'interested' citizens, it was evident that many of them had clear opin-

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[238] The semi-official accompanying evaluation carried out by researcher from University of East Anglia discusses the non-uniformity of the procedures as a methodological problem (Understanding Risk 2004). This I will not touch upon here.

[239] I was present at two such meetings, one of the six regional launch meetings (Harrogate 13.6.03, approx. 180 participants) and one local meeting arranged by the city council of York (15.7.03, approx. 50 participants). Full transcripts of the presentations at all six launch meetings were also available, approx. 100 pages of text.

[240] This was also the impression of an industry representative who had participated in several meetings, both as speaker and observer. He claimed to have seen the same 'activists' at different meetings across the country and felt that the meetings attracted a disproportionally large share of concerned/GM negative people compared to the general UK population (Dr. Julian Little, Bayer Crop Science, interviewed 15.7.03).

This is also the conclusion reached in the board's report, which claims a 5 to 1 ratio of 'negative' compared to 'positive' statements in the transcripts of the debates in the six launch meetings (GM Nation report §84).

ions and a considerable knowledge of the issues. As such, the participants were probably not representative of the general population in terms of interest, attitudes or knowledge. Many seemed to have prepared by reading leaflets, articles and the like, and during the discussions references were often made to various publications and statements from organisations.

Again, at the launch meetings in particular it transpired from many of the questions raised in regard to the debate process that a number of participants were sceptical towards the process and as to whether their views would really be taken seriously by the Government. Nonetheless, there was a serious and substantial engagement with the issues. The discussions I had the opportunity to observe showed that both advocates and opponents of GM crops engaged with the arguments of the opposite position. Despite often stark differences of opinion, I did not witness that any attacks were made on the motives or integrity of the participants. Even if – as it seems reasonable to assume – some participants held their discussion partners' views to be wrong, misled or invalid, there was social pressure to not let this show in face-to-face interaction. Although scientists from companies involved in biotechnology and farmers that had participated in the farm scale trials (some of whom were quite positive towards GM crops) were present, these were not identified with either 'industry' or 'GM technology' as such, nor did they make opponents out to be self-serving activists. Differences in points of view were dealt with through argument, not through symbolic attacks on motives, personal integrity or through denigrating gestures or the ridicule of people present. As such, it seems that deliberative face-to-face interaction does acquire a dynamic, which is significantly different from staged debates with an audience or mass mediated exchanges of view (cf. van den Daele 2001).

The discussions, however, were only moderated in a very loose sense. This meant that the debates were not structured as rational discussions in a Habermasian sense, where arguments or viewpoints are necessarily met with counter-arguments or 'evidence' on the same reality-level, and discussions are brought to their 'logical' conclusion. Rather, the debates constantly oscillated between factual and normative statements of various kinds. For instance, a claim that GM crops would lead to a decrease in the use of herbicides could be countered not only by disputing that this in fact would be the effect, but also through claims that organic farming was preferable (i.e. 'moral' arguments about the appropriate baseline of comparison), or that GM crops were only marketed to create profits for the agrochemical industry (i.e. arguments about the distributional effects of the technology). As such, a number of different types of knowledge were brought together and confronted. This, however, rarely led to a consensual end of disagreements. As I observed it, convergence occurred only on where agreements and disagreements existed (to the extent that perspectives could be brought into congruity with each other at all). No one, it seemed, was at any point persuaded to change his or her point of view substantially.

Although many of the participants were prepared and well informed, much of the discussion was concerned with the general feeling that not enough was known. Hence only few participants made cocksure cognitive claims on matters of fact. When somebody did, they were typically met with the question of 'how do you know?', that is the questioning of the quality of available knowledge, or 'says who?', i.e. questioning the reliability of the source of knowledge. The participants drew on 'personal' experiences, either as farmers, consumers or citizens. This meant that BSE was often brought up as an example both of the uncertainty accompanying interference with nature and unreliability of responsible regulatory agencies. The reference to uncertainties did not mean that a number of 'facts' were not exchanged. Many factual statements were aired, and there was little 'quality control' of the facts stated even if some participants made references to different reports, investigations and the like. Factual statements were typically impossible to assess or verify in the discussions, and most were about things beyond normal sensory or everyday life experience and belonged in the sphere of 'science'. Regarding the status of science in the debates, it seems as if all participants assumed and accepted that facts could be 'spun' in certain directions to serve the agenda of a given source, and that it was extremely difficult for ordinary people to undertake any reliable quality assessment. Yet paradoxically, although the reliability of the science involved – in both cognitive and institutional terms – seemed to be at the root of the issue, everybody seemed to agree that research was needed as an indispensable precondition of settling the issues. Although GM technology was seen as a – largely unpopular – product of science, science was not demonised as such. Rather, it was implied that the reliability of facts was impossible to assess without knowledge of its source. As one participant summed up: "... we are mainly for the further research, we are not quite sure how we are going to get research that we will believe in." (Debate meeting Harrogate 13 June 2003 transcript). It transpired that the assessment of the reliability of sources of information was more closely linked to the interests of their originating organisation than an assessment of cognitive competences. Although industry may have the best scientists and most resources at its disposal, this does not convince people that their claims are more reliable than those of an under-funded NGO – rather on the contrary.[241]

The oscillation between factual and normative statements meant that often the morals and ethics of the promoters of GM technology were touched upon.[242] However, on closer inspection the discussions I witnessed actually showed no signs of disagreement on the basic normative principles that ought to guide the regulation of technology. Everybody (at least implicitly) agreed that things that could potentially damage human health or the environment should not be permitted. As such, the discussions were not so much about moral

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[241] This corresponds to social psychological research showing that evaluation of source credibility is determined by whether their messages correspond with pre-existing attitudes (Frewer et al. 1998, 1999).

[242] Mostly that their motives were questioned and – to put it in Luhmannian terms – a withdrawal of esteem was communicated.

principles as about how such principles should be interpreted and possibly traded off against each other.[243] There was what seemed to be an uncontested consensus that health and the environment should be protected. The discussions were about the interpretation of these principles in the light of cognitive and social uncertainties, and what distributional effects these uncertainties potentially could lead to. For example, if such basic principles could be expected to be upheld where technology is primarily or exclusively driven by the interest of multinational corporations.

The organisers on the steering board expressed – both in interviews and in the final report – contentment with both the quality of the debates and the resonance achieved,[244] even if some of them believed that much more could have been achieved with a better planed process. However, the verbal communication of meetings is transient and since I am primarily interested in the effects of the debate it is not enough to analyse interaction at meetings.[245] We must see what parts of it were carried into the continued communication in the policy arena.

Debate Outcomes

The public part of the debate process continued for six weeks and ended in late July 2003, after which a report of the whole debate (GM Nation Report 2003) was written up for the steering board by a consultant hired for the task under the board's supervision. It came out in late September 2003, and represented the final product or output from the debate.

During the process both GM sceptic NGOs and participants in the meetings had expressed concerns that the whole debate was a PR scam designed to legitimise decisions already made. These speculations did not appear to be well founded, as the report was judged as surprisingly blunt to many observers. Apart from the disclaimer that the report only attempted to reveal what the public thinks and feels about GM issues, and not whether they are right or wrong, "even on matters of fact" (ibid: §29) – the message is rather unambiguous. The results were summarised in seven key messages:

1. "People are generally uneasy about GM
2. The more people engage in GM issues, the harder their attitudes and more intense their concerns

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[243] An observation that sits better with a cultural theoretical framework of analysis than with, for example, the deficit model ascribing differences in technology acceptance to the command of cognitive knowledge.

[244] The final report claims that: "Despite some adverse and at times cynical media coverage of the launch of the debate, the volume of activity increased week by week. ... Not only the quantity but the quality of response – all of it voluntary – was impressive.... Whatever its other results, the debate demonstrated the power of people to engage in complex policy issues if they are given the opportunity." (GM Nation report §28).

[245] As is done in more detail in the volume edited by Renn et al. (1995), where the focus is primarily on the deliberative or process quality rather than the effects of such procedures.

3. There is little support for early commercialisation
4. There is widespread mistrust of government and multi-national companies
5. There is a broad desire to know more and for further research to be done
6. Developing countries have special interests
7. The debate was welcomed and valued"

(ibid: p. 6-8)

The points are elaborated through descriptions of how the debate came about, why it was different from usual consultation exercises and more detailed description of the various elements, processes and contributions to the debate. Although the report duly lists both arguments made against and in favour of GMOs, as was laid out in the agenda for the discussions, there is no doubt that the picture painted is one of an overwhelmingly negative attitude to GMOs among the participants.

Perhaps the most interesting aspect of the report in the present context is the apparent strategy for establishing the credibility of the outputs. This I see as consisting in two features. One is that despite the claim to be largely qualitative in character (§37), there are numbers strewn throughout the report. It has been noted that in order to appear credible in the political system, a certain quantifiable element seems desirable – politicians want numbers! (Irwin 2001). However, in this case an argumentative problem clearly existed in the fact that the participants in the debate were not statistically representative in the sense normally required from surveys.

Therefore, a substantial part of the report is devoted to comparing the contributions and attitudes of the 'self-selected' participants in public meetings and those writing letters or filling out questionnaires, and the 'selected' recruited participants in the reconvened 'control' focus groups. This is perhaps where the politically most interesting perspective emerges, as the report concludes that: a) Although there are differences between the two groups, they are more on the level of detail and forces of conviction rather than fundamentally different perspectives on GMOs.[246] There is therefore no 'silent majority' in the "sense of being a completely different audience with different values and attitudes from an unrepresentative activist minority" (ibid § 195) b) Rather, the more the selected focus group participants engaged with the issues, the more they grew sceptical and aligned themselves with the voluntary participants on some dimensions. Although they were more willing to acknowledge that there might be benefits from GMOs (ibid: § 205-206), they grew more convinced over time that not enough was known at present to introduce the technology (ibid: §172).[247]

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[246] Put more abstractly, the report argued that the intensity of the preferences varied, not the direction.

[247] As it was not within the remit of the steering board to formulate policy recommendations, the report did not entail any such valuations of whether the public sentiments explored were 'reasonable'.

The publication of the report received significant media attention. The chair of the steering board was interviewed on BBC's Today programme[248], the major TV news programmes all ran features on the report and several leading newspapers provided substantial cover and leading articles on the outcomes.[249] The coverage was tinged by mild surprise, not at the fact that 'the public' had proven hesitant or resistant but by the "startling [...] scale of that rejection" (Leader in The Independent, September 25th 2003). Most reports carried many of the percentages listed in the report, but also commented on the fact that the quantitative result did not represent a cross section of the British population. Nonetheless, it was stressed that the non-public focus groups seemed to indicate a significant reluctance towards the technology and low trust in the Government. The media did not really question whether the results were a reliable indicator of public opinion, but provided commentary both on the 'reasonableness' of public opinion[250] and the challenges this raised for the Government.

Naturally, however, the media carried reports on the reactions of the various stakeholders, which responded in ways that were hardly surprising. The GM sceptic NGOs – who had been quite critical of the process leading up to the debate – framed the outcomes as significantly supporting their cause. For example, a spokesperson from Friends of the Earth claimed in a press release, which was quoted in several newspapers, that: "The Government will ignore this report at its peril. There must not be any more weasel words from the Government on this issue. It must stand up to US and corporate lobbying, honour the findings of its own consultation and rule out the commercialisation of GM crops". The Consumers' Association claimed that: "The consumers view could not be clearer and the government can no longer afford to hide behind industry skirts and ignore it." (M. Warnock, quoted on www.bbc.co.uk).

Industry representatives, on the other hand, tried to play down the importance of the debate. The Agricultural Biotechnology Council said only 0.1% of British citizen had been interested enough to take part in the discussions – 99.9% had not been heard – and that those participating were mostly "orchestrated by campaigning groups". "It is clear that the opinions of those ideologically opposed to [GM] technology were given equal weighting to carefully researched, factual evidence about GM foods" claimed Paul Rylott, chair of the Agricultural Biotechnology Council (industry organisation) – and member of the steering board (The Guardian, September 25th 2003).

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[248] Considered a leading agenda-setting news programme on BBC Radio 4.

[249] The Guardian, The Independent and The Times all commented on the debate outcomes in leading articles.

[250] Mostly, the outcomes were interpreted as the exercise of common sense given the uncertainties the scientific review – published between the end of the debate and the publication of the report from the public debate – had pointed out, and the lack of direct consumer benefits

In effect, immediately upon the publication a discursive struggle about the interpretation and importance of the output broke out – and it would probably be fair to say that the GM sceptics had the upper hand. The sceptics had the wording of the report on their side, whereas the GM proponents had to attempt to discredit the process, which they had to some extent participated in shaping. However, more interesting is that most sections of the media took the report more or less at face value as a reliable product and representation of public sentiments and started spelling out the dilemma it might present to the Government.[251] As formulated in The Independent: "And now this scepticism and hostility has been rubbed in the Governments face – through a public debate it endorsed and funded itself – in a way that will be politically very hard to ignore" (September 25th 2003). The Government itself kept a rather low profile in the days around the publication of the report. It only reiterated the promise that it would 'listen' and respond to the results publicly. However, it was clear that the Government was in a dilemma. Not only because it was committed to the technology, but it was also clear that 'public opinion' would not be accepted in the EU system as a reason to reject specific GMOs if it was not at the same time grounded in scientific proof that risks to human health or the environment existed. The Farm Scale Evaluations, which were supposed to answer questions about biodiversity had not yet been published, but they were mentioned – should indicate adverse effects – as the last 'excuse' to change policy. "An atmosphere has therefore been created that may induce Mr Blair and his like-minded ministers to retreat on the basis that the political costs of going forward may be too high – but only if the Farm Scale Evaluation give them the opportunity." (ibid). In fact, a few weeks later the Farm Scale Evaluations did provide such an opportunity (at least for some crops), but the Government did not wish to pursue a significantly altered policy course.[252]

The British Procedure Analysed

Thus far I have described in some detail the processes of the GM Nation? procedure. The description entails a significant simplification and reduction of the actual volume of communication involved, but hopefully the aspects most important for my research problem have been captured. In the remaining part of this chapter I shall take a more analytical approach to the material and interpret some of the events and discursive framings in order to give sociological significance to the story told and render it comparable to the other cases investigated. In short, I shall seek to characterise the procedure as a distinct type of com-

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[251] The Government subsequently complained that the media had reported the quantitative outputs as if they were a representative survey (DEFRA 2004b).

[252] The FSEs subsequently came under public attack for being based on insufficient or outdated assumptions to be of real value for comparison of the effects from conventional and GM agriculture on biodiversity, as they were based on the application of a herbicide (Atrazine), which was to be phased out shortly after due to a ban imposed by the EU. This subtheme I cannot pursue in details here.

munication and attempt to explicate its discursive components and constellation of actors involved.

In the previous case the analysis proceeded by means of contrasting two different initiatives aimed at integrating public concerns into policy making. Here I shall take a slightly different approach and attempt to analyse the discursive dynamic shaping the procedure as the outcome of a discursive struggle between different framings of the steering board of the debate and the UK Government the appropriate modes of public involvement. Basically, I will pose the question of why the Government and the GM proponents apparently lost discursive control in this policy area.[253] On the basis of this analysis, I shall briefly characterise the case according to the questions posed in Chapter IV. Finally, I shall raise the issue of representativeness and inclusion/exclusion as general issues to be addressed by participatory or deliberative procedures, which in my opinion are particularly evident in this case.

Configuring the Science and Society Interface

Arguably, the 2000 House of Lords report 'Science and Society' marked the culmination of a change in discourses about the use of scientific advice in policy making towards a more consultative and dialogical mode (Irwin 2001, Elam and Bertilsson 2003). This 'new mood for dialogue' clearly informed the AEBC's suggestion to have the debate in the first instance. Although the AEBC had no statutory power to insist on an organised public debate, some of the programmatic communications from the Government, which followed these principled debates made it difficult to reject the suggestion, even if the Government foresaw that the outcomes could be awkward for its envisioned policies. The 'Science and Society' discourse therefore flowed into and shaped the event.

It is noticeable and perhaps symptomatic that the title of the HoL report is Science *and* Society, rather than for instance Science *in* Society. For a sociological observer it can seem untenable to think of science as something beyond society.[254] However, in order to establish a 'dialogue', it is necessary to have at least two distinct actors, and neither 'science' (as a functional system or a set of knowledges) nor 'society' are actors that can immediately enter into dialogue. Hence, a distinction must be drawn between science and society by designat-

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[253] To choose this explanatory focus calls for two disclaimers. First, it does not imply that the Government 'ought' to have remained in discursive control, only that it either expected or hoped to stay in control, or saw no feasible alternative to agreeing to the procedure. This can perhaps be taken of an example of Luhmann's claim that the political system is capable of steering society only to a limited extent. Secondly, of course, nobody 'admitted' defeat. However, the interpretations in the media left little doubt that the GM sceptics 'benefited' most from the activation of 'the public' in terms of public resonance for their framings of the GM issues.

[254] At least this is problematic within the broadly Luhmannian framework applied here, where by definition all communication, also when specially coded, takes place within and contributes to 'society'. Science may be a particular, self-referential mode of communication, but this communication is co-constitutive of society, not 'beyond' it.

ing who speaks on behalf of science and who speaks on behalf of society. Therefore, the issue to be pursued here is not to what extent science is in- or outside society, but how the distinction is drawn and what effects this has. As such, the distinction is seen as a product of communication, not as a cause or determinant of it.

As neither science nor society are socially well-defined entities (i.e. perceived from all viewpoints in a consensual manner as represented by particular (collective) actors), there is a certain contingency in how the distinction is drawn, which in turn may have consequences for how the dialogue develops. Here I wish to pursue first how 'the public' was operationalised, then how 'science' was brought into the procedure.

The 'science and society' discourse leaves open what exactly the social locus of 'society' or 'the public' is. Hence, when the process was instigated choices needed to be made about how to operationalise the demand for public involvement. My argument is that the selections made – and thereby the specific shape of the procedure – can be seen as the outcome of a struggle between the steering board and the Government emerging from different assumptions about what the public *is* and *ought to be*, and what its legitimate role in policy making should be.

In this case the 'society' side of the science/society distinction refers to 'a general public' in a rather unspecific sense. On the one hand, this public is clearly framed as something other and 'more' than public opinion as measured through surveys. As indicated by the perceived necessity of holding a 'narrow but deep' debate, the public is seen as bearer of richly textured knowledges, which cannot be adequately captured through opinion polls. This public is not equated with the communicative events of the mass media either, in fact it is in danger of being both misled and misrepresented by the media. These images of the public thus have similarities with the concept of *civil society* developed in some branches of (political) sociology (e.g. Cohen and Arato 1992). However, civil society is, in this case, not considered as capable of the sufficient and reliable self-organisation required to be democratically accountable. The organisations present 'in society' and visible in the media (NGOs) claiming to speak in the public interest were perceived (at least from parts of the political system) as biased and self-serving in their stand on GMOs, and not as genuine representatives of the public. Therefore, it was an explicit aim of the debate to bypass such actors, whose "viewpoints have already been made known", aiming instead to the 'real' public. As such, the public hoped to participate in the debate is seen as more *authentic* than both its elected (parliamentarians) and self-proclaimed (NGOs) representatives.

This authentic public is understood as equipped with competences, interests and values, all of which cannot be known in advance by experts and hence cannot be substituted with expert inquiries.[255] Therefore, it was considered important that 'the public' itself was allowed

[255] Not even by sociologists!!!

to formulate the issues for debate. The steering board saw its assumption of an 'otherness' of problem framings by the public confirmed in the initial focus groups, as it was noted that:

> *"... people's overriding frame was question and questioning; but the general public did not demarcate issues and facts into categories of ethics, science, economics etc, as policymakers and professionals tended to.... People approached GM issues through their lived experience (food, my family's health and future, and the cost to me), not experience of GM as such, or a 'debate'."* (Minutes 17 December 2002, §6)

Sociologically, this finding can be interpreted to mean that in the perception of 'the public' the problems associated with GM are not 'ordered' along the lines of the functional differentiation claimed by systems theory to be one of the most significant traits of modern society. They are instead, to some extent in tension with these principles. These tensions primarily manifest themselves as unfulfilled expectations and demands addressed at the political system, techno-scientific innovation and to some degree at retailers. The discrepancies between public perceptions and institutional practices are clearly part of the background of the debate. In the policy arena different actors interpret the causes of such discrepancies differently and try to use them to their advantage. In this case I will suggest an interpretation of the shaping of the debate as the outcome of a struggle in particular between the AEBC steering board and the Government about what this discrepancy *is* and how it should best be *handled*. This was a discursive struggle in a public or at least semi-public arena. This meant that although the Government clearly had the political power (discretionary competences), this alone could not be relied upon to see its objectives through, and a number of argumentative resources were brought into play.

I shall describe this struggle, following Luhmann, along three meaning dimensions: the social, the temporal and the substantive dimension. These are obviously intertwined, but the analytical separation allows me to dissect in a non-arbitrary way the different dimensions of the communicative processes involved. The focus will be on, respectively, who represented 'the public' and how (as well as who was 'forced' to learn), which 'time-regime' dominated the debate, and what 'issues' were put on the agenda of the debate.

Operationalising the Public for Debate

When attempting to analytically reconstruct the shaping of the GM Nation? debate, as well as its relationship with the two other strands, a number of complexities must be faced. In the *social dimension* one of these is how to construe agency. As discussed in Chapter IV I locate agency primarily with organisations. The debate was run by a steering board, which was compiled of persons representing a broad spectrum of viewpoints on GM agriculture and with diverging concerns. Likewise, the British government may not, internally, be a unitary political actor. When I talk about actions or statements of 'the Government', a large number of communicative contributions may be involved, which are 'boiled down' to spe-

cific communications taken to represent the decisions of the Government. However, for reasons of analytical parsimony I shall in the following assume that both organisations can be considered more or less as unitary actors. I hope to demonstrate that this assumption can facilitate an account of the shaping and dynamics of the procedure as the outcome of a discursive struggle primarily between these two actors, which is relevant for the present research purpose. This struggle was based partly in diverging assumptions about what the issues at stake were and partly on diverging organisational commitments and interests.

The AEBC was formed as an advisory body to the Government. As such, its point of reference is primarily the political system, but in principle it should not operate 'politically' in the policy arena but only feed in communication shaped as 'advice'. Nevertheless, in this case it seems that the organisation (and the subsequently appointed steering board of the debate) functioned as a sort of 'internal' opposition making demands on behalf of 'the public' within the policy process. If one perceives of the preparatory phase of the debate as a discursive struggle, it seems that the steering board took upon itself to represent (the interest of) the public and function as an intermediate link between the amorphous 'public' and the political and technological establishment. It did so not by claiming intimate knowledge of the interests and values of the public, but by insisting that greater attention be was paid to making sure these interests and values articulated were in the biotechnology policy-making process in Britain.

Given that the steering board had neither statutory standing nor any alternative means to exert political pressure other than its arguments and the threat of a collective resignation, the concessions achieved may seem somewhat surprising. The Government not only agreed to double the budget for the debate and extend its timeframe, but also committed itself to respond in writing stating what it had learned from the exercise and how the outcomes would be applied in future policy making.

According to my interviewees the Government accepted the suggestion of the AEBC to have the debate because they believed that more political credibility would be lost and more attention stirred by rejecting the debate than by holding it.[256] If it had rejected the call a significant protest potential could have been released, a potential that was arguably increased even further by the initial suggestion to have the debate. At least by agreeing to have the debate the Government could hope to retain some discursive influence. This indicates that the situation in Britain was one where the biotechnology policy formation extended well beyond the institutions of formal politics (Bauer and Gaskell 2002). This process can perhaps be interpreted as one where the Government had realised that 'acceptance' of a technology can be a scarce resource, which is closely linked to trust in the regulatory

[256] In systems theoretical terminology it would see itself confronted with increased resonance in the rather unspecific medium of 'public opinion' (cf. Chapter III).

system. As argued by Luhmann, an organisation is unlikely to ascribe an observed lack of trust to its own failings, tending instead to blame the misconceptions of the trustee, perhaps due to insufficient communication. This assumption must be temporalised in this case, as the British government was acutely aware of the link with the BSE scandal and past policy failures. However, the political system perceived these past failings as rectified and the lessons learned. Therefore, arguably, the Government chose to see the debate as an opportunity to display its competence in handling this new technology. This, however, left some disagreement between the Government and the steering board about the exact purpose and shape of the debate.

The steering board was appointed by the Government. Nonetheless, in its organisational self-understanding as emerges from the minutes of its meetings and my interviews it was probably more inclined to see the Government as its opponent rather than its principal. In the preparatory phase this opposition regarded how 'the public' were to be operationalised in the debate.

As described above, this operationalisation drew strongly on the 'Science and Society' discourse with a particular focus on 'those, whose voices had not yet been heard'. Perhaps the most significant feature of this framing of 'the public' was that it was perceived as competent, interested, and able to debate complex matters in a 'fair' manner given appropriate facilitation and format.

This image of the public was not explicitly rejected by the Government (which is indeed difficult for a democratic government). However, the Government's decision to have the economic and scientific strands added to the deliberation process indicates that it foresaw the need for additional symbolic resources in order to defend its policies in the face of what it perceived as an excessively hostile public climate, which may or may not be mitigated in the debate process. Although the internal communicative processes and strategic considerations of the Government have not been accessed and analysed, little doubt seems possible that the Government was convinced that it had good economic and scientific reasons to support the GM technology. However, the Government was uncertain that these arguments would emerge with what would be considered sufficient strength in the public debate. In order to harness these types of (functional) arguments, they were to be explored and communicated in processes socially distinct from the articulation of public concerns, but hopefully resonate in the public debate.

Considering that the whole procedure was instigated as an organised top-down process originating in the political system, it is noticeable that there really was no overarching blueprint for the process. For an outside observer it emerges as something, which can be described as a process of mutual accommodation of different interests and discourses. Despite programmatic statements by the responsible minister of the synergistic effects to be aimed at between the three strands, not much substantial interaction actually took place.

There was no well-defined responsibility for such interaction to occur, and it only did when it seem mutually beneficial for the organisations involved.

There was some thematic transfer from the public debate activities into the scientific and economic inquiries, but the activities were kept socially distinct. In short, topics were transferred from the socially distinct but thematically inclusive context of public debate to the functionally differentiated and exclusive semantic fields of science and economics. Here, however, they were processed by more or less traditional means (role differentiation and standardised procedures for knowledge production and assessment).

Arguably there were then three competing framings of 'the public', and three designated positions from which public concerns could be observed, which intermingled in the overall process. The first was propagated by the steering board as citizens to be activated in deliberative processes spanning a range of issues; the second by the scientific review panel as a questioning, mostly passive audience of expert risk assessments; and the third as virtual or potential future consumers, characterised primarily by their expected willingness to consume.

Where the Government's attitude can perhaps best be summarised under the motto of 'getting the facts right', the intention of the steering board was 'getting the debate right' or 'getting the concerns right'. As I have tried to indicate, this led to a shaping of the debate which on the one hand was inclusive, i.e. everybody who wanted to could participate, but on the other hand the demand of the political system that the debate should not function as a referendum was also fulfilled, as no representativity could be claimed for the output. This meant that although the procedures was conceived to be non-exclusive, in that the public meetings were open to all, the credibility of the procedure could only be established subsequently by means of the exclusionary focus groups of non-voluntary participants, who were arguably more socially representative than the participants in the public part and yet did not differ fundamentally in their assessments.

In the *temporal dimension* the struggle between the steering board and the Government was mostly about the timeframe for the debate (how long does deliberation take?), the temporal synchronisation with the other strands and the Farm Scale Evaluations (will the debate be relevant if timing does not allow the debate of expert testimonies?) and ongoing policy issues (reassuming approval procedures within the EU framework, avoiding the looming trade conflict with the US). The steering board (and the NGO community) wanted time for a more extended deliberation, whereas the Government wanted to see the debate completed and reported in time to make a clear temporal separation between the debate and any policy decisions to be made. In this respect, the Government largely achieved its objectives as the public debate terminated before any of the scientific or economic results could

be included.[257] However, on a more ideological level the disagreements in the temporal dimension were also about 'when' the public should be involved, and possibly enabled, to shape the use of technology. This perhaps says more about the role ascribed to 'the public' in the shaping of technology than the temporal contingencies of the debate arrangement.

The Government largely ascribed to a liberal model of technology regulation, according to which innovation ought to be stimulated and – given that no physical risk to human health or the environment are identified – subsequent market demands will decide if and in what forms any given technology will prevail. Of course, this principle had to some extent been modified through the adaptation of a precautionary regime, according to which ('justified') doubt about safety could halt the introduction of a given technology even if no clear evidence of risks could (yet) be provided.[258] This type of regulatory regime obviously presupposes public confidence in both the instrumental competences and fiduciary attitude of the regulatory agencies, but it does not envision an active citizenry beyond individual choices made in the market.

The AEBC and the steering board, on the other hand, to some extent at least, articulated a more deliberative democratic model by which the expectations and concerns of the public should be articulated and preferably incorporated in the shaping and regulation of technologies further 'upstream' in the innovative process. In addition a more active shaping of technological dynamics was envisioned where non-economic objectives could also be included.

By obtaining approval for its suggestion to have a debate, the AEBC had already gained some concession to its perspective from the Government. However, the two different understandings of the appropriate temporal location of public input to the social regulation of technology meant differences in the perceptions of the appropriate purpose and scope of the debate, and what role it could play in establishing public trust. The Government primarily saw it as an opportunity for scientists and regulatory agencies to display their technical competence, which could later help the populace to take the 'leap' into trusting a well-regulated technology. In the eyes of the Government this required some degree of learning technicalities on the part of the public, the debate thus clearly had an educational element. It seems that the Government's temporal perspective on the debate was one of 'preparation' for the introduction of GM technology. To the extent the Government believed that it and its regulatory agencies would learn, it was in terms of anticipating public concerns by

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[257] This was strongly criticised by the House of Common's Environment, Food and Rural Affairs Committee, who saw the debate as 'an opportunity missed' due to underfunding and bad timing. It therefore requested that: "The Government, in its response to our report, must allay the suspicion that, having agreed to undertake a public debate, it did as little as it could to make it work." (HoC 2003: 18).

[258] This had, in the opinion of some GM protagonists, been severely violated in the demands for extensive labelling, which they claimed entailed an unnecessary stigmatisation of something which was not 'substantially' different from other agricultural products.

using the debate to probe these and perhaps make minor changes in regulatory principles in order to accommodate 'mainstream' hesitations and mitigate whatever mobilisation potential existed beyond the already committed NGOs.

The AEBC and the steering board, on the other hand, saw the debate as an opportunity for a collective deliberation, which could significantly contribute to the way the technology would be adopted in the British agriculture and food industry. As explained by several of my interviewees, the AEBC and the steering board accepted the technology induced approach – which some of the members considered to inappropriate or insufficient – exactly because they felt convinced that the debate was bound to spread to 'neighbouring' issues once deliberation got under way.

As such, it can perhaps be said that on the practical level the Government's temporal perspective on the debate dominated, as the timetable of the process was synchronised with the requirements and demands of the political system and not with the needs of 'the public' as defined by the steering board. However, on the more 'ideological' level the steering board won more headway as the debate arrangements were shaped by the premise that 'the public' had legitimate concerns to be addressed by innovators and regulators earlier in the process than the market model of governance foresees. This was of course intimately linked to the substantive agenda of the debate.

The *substantive dimension* concerns what issues were put on the agenda of the debate and how. The first thing to note is that the event as such was 'technology induced' as opposed to 'problem induced' (cf. Chapter II). This technology induced framing partly originated in the genealogy of the debate as it emerged in the AEBC analyses of issues surrounding the Farm Scale Evaluations. Nonetheless, here too there were tensions between the AEBC's ambitions for the debate and the purposes and scope envisioned by the Government. Simply put, the Government wished for a 'narrow' agenda where technical issues were central, and which would allow the debate to function as a sort of probe into the acceptability of their intended policy initiatives. Also, it was in the interest of the Government to keep the agenda relatively closely linked to existing regulatory principles in order that these would not be fundamentally challenged. However, aside from the initial remit given by the Government in its acceptance of the debate, the steering board was given a free rein to set the agenda for the debate. As described, this was done not by looking at perceived deficiencies in the regulatory framework, but by asking 'the public', here operationalised through focus groups, what the agenda of the debate should be.

The Government did not then directly take part in the agenda setting of the debate. However, the addition of the two expert strands must nonetheless be seen as an attempt to keep some discursive control over the events, and mobilise argumentative resources that could

help to restrict the influence of more 'programmatic' demands should they emerge in the public debate.

These diverging objectives in the substantive dimension also led to some tension between the Government and the steering board as I have described. The continued insistence of the Government that regulation in the future would be 'evidence-based' drew into question the meaningfulness of the exercise precisely because the steering board detected great public concern over the ability to actually control and predict the potential adverse consequences of a large scale deliberate release of GM crops into the environment and food chain, as well as the reliability and trustworthiness of regulatory agencies and biotech companies, and the wider socio-economic consequences expected to emerge from the implementation of the technology. Although the steering board did not agree internally about whether it would be possible and/or desirable to attempt to make the agenda 'science-driven' or 'concern-driven', or on the importance of including these wider aspects of a potential large-scale acceptance of GM agriculture in the debate, the board as an organisational unit insisted on allowing a relatively inclusive agenda.

The Use of Science in the Procedure

I argued above that neither the 'science' nor the 'society' sides in the distinction were clearly operational, and traced in some detail how the society or public side was shaped as a result of discursive struggle and mutual accommodation between the steering board and the Government. I shall now devote some attention to the use of science in this particular case.

Today it seems widely recognised both within the scientific community and in its environment, that science as a system operates with a certain diversity on the programmatic level. Different theories and approaches may produce different perspectives on a given problem and still be equally 'scientific'. In areas where the communication of 'truths' (matters of fact) have contentious impacts beyond the scientific system itself, this interpretive flexibility is often responded to by means of social mechanisms that can establish the credibility of the knowledge required to solve practical problems. One of those mechanisms is that of including both 'expertise' and 'counter-expertise' (Krohn 1997). This strategy can be based both in epistemological considerations about special knowledge possessed by particular groups, or on political convenience.

In this particular case it was acknowledged from the outset that the 'broad' composition of the review panel was necessary if wider confidence in its work was to be achieved, both in terms of substantive areas covered and the member's perspectives on GM agriculture. This led to a situation where the scientific review panel had dual organisational goals, as it was to deliver both an integrated overview and evaluation of the scientific knowledge – including uncertainties and gaps in knowledge – on a number of issues surrounding GM technology, *and* create credibility for itself by being seen as socially inclusive and fair to 'cognitive mi-

nority' positions. In accordance with British traditions all members were appointed in a personal capacity. Officially this meant that no member 'represented' interests other than those of the general public. Nonetheless (some) members were appointed after suggestions from different organisations and at meetings with the press the chair of the panel stressed that 'all viewpoints' were represented on the panel.[259] According to one of my interviewees this led to a split between the internal and external communication processes of the organisation. On the 'inside' scientific arguments, methods and evidence were presented as value neutral and objective characteristics of 'the scientific approach', to which social affiliation or political preference made no difference, in other words as a mechanism to achieve unanimity. On the 'outside', however, the social inclusive composition of the panel was stressed in order to gain credibility for the evaluations.[260] This created both argumentative advantages and disadvantages for the minority of GM sceptics on the panel.

As the study was organised as a review of existing, peer-reviewed scientific output, the mainstream (reductionist) perspective dominated. Due to time pressure, the drafting of the report began almost immediately upon commencement of the work, which left little room for more 'paradigmatic' discussions about what were appropriate theoretical models and evidence. And as scientific knowledge production on the operational level has a 'structural preference' for verified rather than falsified results (as such results are more likely for scientific communication to continue), or, for certain rather than uncertain results, sceptics argued that there was a scarcity of published research addressing the complex causal interactions they were concerned about.

On the other hand, the true/false codification of the scientific system is just as suited for communicating dissent as it is agreement, and as there was a certain pressure to reach unanimity in the work, the GM sceptics were given some argumentative leeway in the fact that the final report stressed uncertainties and a lack of knowledge more than the majority of the panel thought necessary and appropriate.

One feature, which is emphasised in the report from the panel, is that apart from being the most thorough of its kind, the review is also the first 'driven by the concerns of the public'. This was stated as an aim within the initial remit of the work. To begin with this was contested by some of the scientists participating, who felt that they should occupy themselves only with the 'real issues', not with what they perceived to be public misconceptions.[261] In the theoretical terminology suggested in Chapter III this can be considered as an immunis-

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[259] Some members were actually described by the chair as 'NGO experts', although they were in fact academics who had been suggested by NGOs, but did not consider themselves to be any less 'proper' experts that than those in favour of GM crops. Same categorisation was made by the minister of environment, Elliot Morley, when answering questions about the review in the House of Commons (Commons Hansard, 17th July 2003).

[260] Interview with A. Stirling.

[261] Interview with A. Stirling.

ing reaction from the scientific system against the intrusion into its domain of 'inappropriate' distinctions. However, some of the more GM sceptic panel members insisted on the importance of the principle for the panel's work. Practically, this meant that the report was structured around those questions emerging from the steering board's initial focus groups, which the panel thought were amenable to scientific answers. This, however, did not mean that 'the public' had any say in the selection and weighing of theories, methods and evidence included in the review. The public was allowed to ask questions, but was not as such admitted any influence over how the answers were provided or validated. Here the public remained in its more traditional audience role.

Nor was this 'translation' of public concerns into scientific questions without difficulties. Typically, it meant a reduction in scope of the issues involved. One example given to me was that the scientist in charge of drafting a chapter on the reliability of GM crops interpreted the question emerging from the focus groups: 'Are GM crops reliable?' to mean 'What proportion of the plants that emerge from a modification process is actually usable (get the desired characteristics without 'side effects')? Here it seems obvious that everyday and scientific language are somewhat at odds, as the concerns about 'reliability' aired in the public discourse presumably go a lot further than agronomic characteristics. However, the scientific terminology has a specific, operational definition of reliability – which is what can be assessed 'meaningfully' from the scientific literature – and this is what dominated the 'answer' to public concerns.[262]

Hence, the scientific review may be structured around the questions posed by 'the public'. However, it is difficult to see the process as one of a genuine or fully 'extended peer review' (cf. Chapter II), as there was practically no confrontation of the methods and conclusion with the broader public.[263]

Perhaps the most important effect of the socially inclusive way the review was conducted was that the GM sceptics managed to make discussions about uncertainty central to the work of the science panel (partly because 'uncertainty' was central among the public concerns), and although the panel concluded that it had found no evidence or indications that current GM food on the market (which was not grown in the UK) posed any health risks, the GM sceptics on the panel got the proviso included in the conclusion that 'the absence of evidence of harm is not evidence of the absence of harm.' The conclusion of the science review was therefore a very cautious 'go ahead', which emphasised the need for more knowledge and the substantial surveillance of released products on a case-by-case basis,

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[262] Example provided by A. Stirling.

[263] When the science panel had published a first version of its report comments from the scientific community were invited. (In principle 'the public' was invited to comment, but responses were expected in the esoteric language of science, not in lay terms. Hence, it can hardly be claimed that the review involved 'the public' in the sense discussed here, but perhaps a scientific 'sub-public'). The NGO community later made the criticism that no revisions were made in the light of comments actually received (Mayer 2004: 9).

both in terms of human health and environmental impacts. It was also projected that such assessments would become increasingly complex if or when GM characteristics were 'stacked' in crops to emerge at a later time.[264]

To the media this was a conclusion which was open to interpretation, and both proponents and sceptics saw their cause supported. Hence, the scientific review can hardly be said to have fulfilled its function in the Government strategy, namely to convincingly show that GM crops do not exhibit significant risks to human health and the environment. Nor did it seem that the scientific review brought the opposing positions closer to a consensual view of the risks emerging from the technology. For instance, the science correspondent for The Times, Mark Henderson, reported on July 22nd 2003 on the publication of the science panel's report that "*The verdict of the official GM Science Review ... greatly strengthens the position of Tony Blair and pro-GM ministers, who are keen to see the technology licensed for commercial use as soon as possible*". On the same day, however, environment correspondent Paul Brown reported in The Guardian that: "*Government hopes of an early introduction of commercially grown GM crops in Britain suffered another setback yesterday when the world's most comprehensive scientific review of the subject emphasised the uncertainties and potential dangers of the crops rather than the advantages. .... Perhaps the most damning conclusion from the government's point of view was that it would be impossible to grow some GM crops without cross-contamination of organic and conventional fields of the same species.*"[265]

This illustrates how scientific knowledge can be interpreted quite differently depending on the preferences or bias of the observer. Internal disputes are reproduced and even amplified outside scientific organisations. More broadly speaking it can be seen as an exemple of the Luhmannian point that more scientific investigation does not necessarily reduce uncertainty at the societal level, nor does it automatically ease political decision-making. Perhaps the contrary.

The circumstances surrounding the economic study were somewhat different. The study was not undertaken by a broadly composed expert panel, but by the Cabinet Office's Strategy Unit, which organisationally is a part of the Government. Hence, one may ask how it came about that the results were contrary to the goals of the Government. I have not in-

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[264] i.e. crops containing two or more genetically engineered characteristics.

[265] In the same article the Agricultural Biotechnology Council, a bio-industry body, was quoted as saying that "the report endorsed its view that there were no expected or observed detrimental health effects from the introduction of GM crops and GM foods, and that genetic modification, as an option for developing crops, was as predictable and reliable as other crop breeding methods." This interpretation contrasts with one given on July 21st, also in The Guardian by Pete Riley from Friends of the Earth: "Far from giving GM crops the green light, this report admits that there are gaps in our scientific knowledge and significant uncertainties about the long-term impacts of GM food and crops on our health and environment". And still stronger by Doug Parr of Greenpeace: "This committee was deliberately stacked with GM flag-wavers, but its so-called findings still come nowhere near justifying the risks."

vestigated the work of the economic analysis in detail, but a few observations may be required to understand the role the economic strand played in the overall process.

The economic study had, like the scientific review, reference to a specific functional subsystem, the economy. This meant that the study and its output belonged in a particular semantic field; that of economic costs and benefits, which largely excludes 'other' issues. However, the study was not itself 'economic', i.e. part of the economic system, but a social scientific observation of the economy. It was built on scenarios, or 'possible futures'. Such scenarios are of course dependent upon the assumptions made about a number of issues and conditions, which tend almost inevitably to be biased.[266]

The study was undertaken by a group of economists created for the purpose within the Strategy Unit. It seems that the unit was relatively independent of political influence, and that the prime interest of the group as an organisational unit was to create scenarios, which were not too vulnerable to criticism by any stakeholder. One of my interviewees, who served on the steering board, claimed that the group was attentive to the criticisms and suggestions made by members of the steering board, but that in the end the report was "pushed around Whitehall and was quite significantly tempered. A lot of things did not make it into the final version."[267] Hence, we see signs of some politically awkward results being 'tempered', but a Government very cautious not to be seen as conspicuously manipulative.[268]

According to my interviewees, the analysis group started out with some 'traditional' economic cost-benefit methodologies, which were criticised both by members of the steering board and other stakeholders as being too insensitive both to public concerns and scientific uncertainties. These criticisms allegedly had significant effects, and in the end an approach was chosen where scenarios were developed along two central dimensions: whether consumers would embrace or reject GMOs and whether GM-specific regulation would be required or not. These different 'possible futures' obviously entail significant contingencies. However, the analysis leaned towards the expectation that in years to come the public was unlikely to fully embrace GM products, and that scientific uncertainties combined with a sceptical public would mean that GM-specific regulation with substantial monitoring programmes would be required. This led to the conclusion that in the short term, there would be little benefit from the commercial growth of GM crops in the UK, but in the longer run

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[266] In the cultural theoretical meaning of the term, i.e. observer dependent and linked to forms of social organisation.

[267] Interview R. Grove-White.

[268] The relative independence of the analysis is stressed in the press release from the environment minister, Elliott Morley, accompanying the publication of the report: "The Strategy Unit has explored the economics of GM crops in a *very open and transparent manner*. I am particularly pleased that they involved experts and stakeholders from *all shades of opinion* to ensure there was balance and rigour when examining this important issue." (Emphasis added). Balance, openness and inclusion is stressed, whereas competence or validity is not mentioned – presumably it is assumed to emerge out of a process with the aforementioned characteristics.

the British economy might suffer from lost innovation potentials if GM crops were banned.

Effects of the Procedure

The results from the debate as formulated in the report from the steering committee came out in September of 2003 and the Government's promised response was expected shortly after. However, it did not emerge until March 2004. This may of course be due to other priorities of the Government,[269] but it does seem to indicate a certain perplexity in the Government about how to proceed in this policy area in the light of fierce public opposition.

In its response the Government acknowledged that the "findings of the public debate broadly reflect the current state of public opinion on GM crops", and that "the peoples attitudes towards GM crops are shaped by a complex range of issues and concerns, and that to some extent GM crops have become a focus for much wider concerns" (DEFRA 2004a: 4), meaning that the assessment by the public of whether GM technology 'works' is based on a more extensive set of criteria than the ones entertained by regulators and technologists. On this background the response outlines a number of principles on which future policies will be based. These undertakings are not framed as an alteration of policies, although perhaps the safeguarding of choice for both consumers and farmers between GM and non-GM products through strict rules of co-existence is emphasised more than in earlier policy statements, and as it is stated that a fund paid for by GM producers to ensure a compensatory scheme for adventitious GM contamination will be considered.

When viewed in its entirety the Government's reply reads almost like an ideal typical articulation of a 'hierarchical' worldview as outlined in Chapter III. It is reiterated again and again that a strict regulatory framework will ensure the beneficial use of the technology. For instance, "(w)e believe we should keep an open mind and allow the technology to develop within a strict regulatory system that is designed to protect human health and the environment while providing choice. Ultimately the market will decide whether GM crops are a success or not " (ibid: 29). Arguably, the last sentence indicates the admission of a more 'individualist' viewpoint, stating that in the end market forces will – and should be allowed to – decide the fate of GM technology. The image of knowledge propagated in the response also seems to correspond very closely to the hierarchical ideal of 'complete and organised', and the gaps identified in knowledge as relatively easily closed.[270] The concerns raised in the debate that GM agriculture would only serve 'big business' was placed under

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[269] Notably the political tension preceding the war in Iraq.

[270] "As the Review [of the scientific panel] states, risk is a product of hazard, i.e. actual or potential harm, and the likelihood of exposure to that hazard. While we recognise that the boundaries between hazard and risk are not always clear – the Science Review itself blurs these concepts in places – the risk assessment approach allows for uncertainty to be dealt with and managed." (DEFRA 2004a: 26).

the heading of 'ethical issues' and countered with the argument that other ethical viewpoints (notably those by the Nuffield Council) had argued that pursuing genetic engineering was a duty towards the poor. Hence, while the response essentially can be characterised as 'hierarchical' with some discursive alliance with the 'individualist' worldview, concerns emerging from an 'egalitarian' perspective, concerned with distributive issues, are dismissed as adequately addressed through regulation.[271] In the theoretical language of the thesis this can be interpreted as a certain immunisation by the political system and its central organisational locus against the intrusion of more unspecific concerns that do not translate easily into manageable policy objectives – especially as the Government had already prior to the debate communicated a relatively strong pre-commitment in favour of GM crops from which it felt reluctant to backtrack. Concessions could then only be made on the basis of new scientific insights (for which the political system had no responsibilities) not because the legitimacy of decision making was questioned (which is, exactly, the responsibility of the political system).

Apparently, however, concessions to the market operators were not considered far reaching enough. One immediate response to the Government's policy statement was the announcement by Bayer Crop Science – one of the biggest companies involved with GMOs in the UK – that it would move all research and development activities to the US because it found the climate in the UK too hostile, and support from the political system insufficient (reported in, amongst others, The Observer, September 28, 2003). Obviously other significant effects from a procedure like GM Nation? take time to manifest themselves. Therefore, what I will point out in the following are tendencies rather than definite changes. However, it does seem possible to argue that the GM Nation? debate had a significant effect on the policy discourses and reception in the public sphere of GMOs in the UK – perhaps more so than many actors expected at the outset. It did in fact create a significant resonance, although this cannot be said to be the product of any specific actors' intention. I shall briefly pursue this subject according to the three communicative dimensions in the following.

In the *social dimension* it seems clear that the GM sceptics emerged stronger from the debate, whereas the protagonists lost some argumentative momentum. There was a subtle shift in the power relations to the advantage of the NGO community, 'power' here being understood as the ability to select and achieve attention to specific problem framings in the policy arena.

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[271] For instance, it is claimed that: "Although some people may be uneasy about the role of multi-national companies in developing and promoting GM crop technology, we believe the appropriate response is to ensure that the technology is effectively regulated to protect the public interest (DEFRA 2004a: 29).

If the Government had seen GM Nation? as a contribution to solving both an information problem (what is at stake in public opinion?) and a decision problem (what is to be done?) it was only partly satisfied. Instead of acquiring information about the public that could be fitted into existing schemes, it seems that it had to, to some extent, rearrange its knowledge – which likely did not make decision-making easier. The Government was put on the defensive by public opinion, and the 'hard' scientific and economic arguments it had hoped to rely on turned out to be more fragile as communicative resources than expected when the two expert strands were initiated. However, despite the popular resistance to GM technology, it was clear that the Government, because of international pressure and EU regulation (and its own commitments), could not choose a ban or indefinite postponement for reasons of 'public opinion', even had it wanted to. Continued restrictions could only be defended if risks to human health or the environment could be scientifically proven or at least shown to be probable. The outcomes of the Farm Scale Evaluations did in principle provide the Government with such an exit-strategy for at least some crops. However, the results were far from unanimous and the 'opt-out' strategy was not pursued. In conclusion it seems that if the Government had hoped for conflict mitigation through 'enlightenment' via the educational aspects of the debate, this did not emerge.[272]

The industry representatives were by the end of the debate clearly engaging in an up-hill struggle. One indication of this is that they initially framed GM crops as a generally benign and useful technology, which did not differ significantly from other plant breeding techniques. The industry was therefore content with the technology-induced approach underlying the debate, as they believed they could convince, if not the entire populace, then at least the political system, that the benefits by far outweighed the potential risks without having to discuss alternative breeding and production regimes. However, towards the end of the debate a more problem-induced argumentation can be observed, whereby GM was presented as one possible option among a number of technologies which all had a place in modern farming. This indicates a shift in strategy from an attempt to achieve general acceptance of the technology to 'just' making sure that it would not be regulated so strictly as to be further stigmatised and therefore unfeasible for farmers.

Affiliated with the industry responses was a reaction from the scientific community (or parts of it), who in an open letter to the Prime Minister complained of a mishandling of the public debate, as proper scientific argumentation had allegedly been marginalised by activists and the Government had failed to correct misconceptions and address public hostility to the detriment of the economic and scientific well-being of the country (e.g. The Guardian, 1 November, 2003). They argued that if unfounded public hostility was allowed to im-

[272] Partly perhaps, as noticed in House of Commons (2003), through its own faults in insisting on a timeframe that did not allow the evidence of the two expert strands to flow into the public part of the process.

pede on the commercialisation of plant science research the knowledge-base would deteriorate and scientists would leave the country.

The GM sceptic NGO community, on the other hand, who had initially showed little confidence in the debate process, and mostly saw it as a PR exercise in favour of GM crops, emerged triumphant from the process and framed themselves and their cautious attitude as aligned with that of the broader public. This is seen in claims that the Government can 'no longer' ignore public concerns, and implicitly that now 'the public' is once again 'virtual' in the policy arena, then NGOs are representing them. Furthermore, the NGOs seemed to be able to do so without having to reflect upon whether they themselves had contributed to creating these public concerns. As such, it can be argued that the 'learning incentives' provided by the debate seemed bigger for the GM proponents than for the sceptics.[273]

In the *temporal dimension* it seems evident that the public hesitation slowed down any policy initiatives in the field aiming at an introduction of GM crops on a commercial basis in the UK. The sceptics' temporal perspective – the postponement of any large scale releases until more knowledge and more rigorous regulatory frameworks are in place – seems to have won out so far over those who think that enough experience has been established to proceed to large scale growth under some type of regulatory surveillance.

There also seems to be a subtle shift of the framings in the Government's communication on the issues from the problem of the public not being ready for GM technology to the technology not being mature enough for the needs and preferences of the British public. More abstractly it can be argued that the Government as an organisation works by making decisions and the moving on to other issues. This is not so for the NGOs, who need to constantly (re)problematise broadly similar issues (environment, consumer choice etc) to maintain their presence in the public sphere. The debate did not settle many issues and the GM topic remained on the public agenda.

If the *substantive dimension* is broadly understood as communication about when a technology 'works', the outcome of the debate was clearly that broader ethical and socio-economic issues, which were officially excluded from regulatory processes, gained more prominence in the policy arena, even if the Government attempted to tone them down in its response to the debate. The same goes for the recognition of uncertainties related to both health and environmental effects of GM crops and food, which strengthened the demands for more knowledge. This, however, was perhaps more due to the outcomes of the scientific review and the economic analysis, which made it more difficult for proponents to argue that potential problems would largely be outweighed by environmental and economic benefits.

The debate arguably exposed a mismatch between the expectations of the public as operationalised in GM Nation? and the regulatory principles and institutional framework sur-

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[273] Although one of the consequences drawn – withdrawal from the UK by a major commercial operator – arguably constitutes a perverse kind of learning.

rounding biotechnology. This made it clear that the Government's insistence on a purely science based approval procedure combined with the market regulation of technological development did not command public confidence. As summarised by the GM sceptical NGO GeneWatch: "The lack of public appetite for GM crops is clearly contributing, behind the scenes, to delays in allowing growing to go ahead, but this is a rather underhand approach that helps no one. Rather than having any dialogue, where views are exchanged in an iterative fashion, the public has expressed concerns and the Government has told it that everything is OK. (Mayer 2004: 17). In short, the assessment concludes that: " ... the UK Government really can please nobody" (ibid: 18), as neither the sceptical public nor the GM protagonists are happy with the policies suggested in the area. Of course this constitutes a very simplified description of the situation, but in my opinion it does convey the basic dilemma of the British government subsequent to the GM Nation? debate.

For comparative purposes I shall now summarise the most important characteristics of the UK case in the table devised in Chapter IV and proceed to some final observations about the problem of inclusion.

	Risk controversy thematic:	Trust thematic:	Mediation thematic:
Social	*All-inclusive* procedures (open meetings) supported by non-inclusive 'control-procedure'. Agenda set by exclusive focus groups. Outcomes from all-inclusive public process 'funneled' into political communication by organisers	Government 'forced' to pay attention to concerns of the public by advisory board, but insisted that articulation of public concerns should not foreclose political decision-making. Due to pre-commitments the Government sought to immunise itself to non-scientific concerns and 'ethical' reservations towards the technology were relegated to post-commercialisation market decisions by consumers	Important stakeholders included in organising and reporting procedure. Scientific panel 'inclusive' regarding perspectives on GM agriculture, but 'public' *not* arbiter of knowledge claims
Temporal	Procedure initiated prior to formulation of policy expected from past experience to prove controversial in order to mitigate controversy 'prospectively'	Government seeking to display attentiveness and competence prior to policy formulation, i.e.'the public' given early warning function regarding acceptability of technologies and policies – clearly temporally separated from decision-making	Precaution strengthened through expansion of technical approval procedures, introduction of GM crops slowed down
Substantive	Separation of articulation of public concerns from cognitive and economic issues. (However, science panel exhibit some inclusionary traits unusual for the UK)	Policy decisions allegedly to be made on the basis of best available *cognitive* (factual) knowledge, not public sentiments, hence public confidence is about the use of scientific advice for policy making (e.g. independency of expertise)	Dominant cultural pattern: In 'GM Nation' procedure: Substantive rationality privileged, i.e. predominantly individualist cultural bias (Cognitive knowledge to be decisive) In subsequent policy: Hierarchical (Government assures the adequacies of approval procedures)

The Problem of Inclusion

In Chapter III I argued that a central theoretical trait of procedures of public involvement is that they seek to mitigate technological controversies by means of *inclusion*, i.e. by expanding the circle of persons and organisations involved in shaping policies, and thereby reconfiguring the decision-maker/affected interface. As the comparison of the cases will show, although the substance and social composition of the controversies is largely similar across the cases, inclusionary mechanisms are organised in quite different manners and confronted with various challenges (compared to their self-prescribed aims), some of which are arguably common to them all, some of which are more specific. Hence, *inclusion* is in practice not an unambiguous or uncontested concept. Perhaps the British case analysed here brings out most clearly the challenges for such procedures in terms of selecting a *mode of inclusion*. This is, however, a general issue for such procedures and will be expanded upon in the comparative section.

Arguably, there were a number of challenges to the GM Nation? procedure's ability to actively influence British policy on GM agriculture (discussed in the previous chapter as a question of achieving resonance). Some of these were obviously linked to the external commitments of the British government, notably through the EU regulatory framework. However, some were more domestic and had to do with the UK government's willingness to actually modify its policies in light of the concerns articulated or in systems theoretical terms with the political system's observation of this particular mode of communication as relevant and pertinent for its own operations. Some of these challenges, I contend, can be reconstructed analytically as questions pertaining to what the systems theoretical observation suggested here labels the mode of inclusion, but which can also be analysed as a question of how such procedures seek to establish legitimacy for themselves by appearing to be 'representative' of public concerns.

In this case a particular configuration of the relationship between inclusion and exclusion of particular actors in various communicative contexts can be observed. On the one hand it was very important for the organisers that what they perceived as the hitherto dominant mode of policy formation was supplanted or supplemented by more inclusive considerations, both social and thematic. In order to make sure that the process was also perceived in this manner by 'the public' they wanted to reach, they chose a format from which no one was excluded (open meetings). However, as such a procedure was likely to 'only' motivate those feeling particularly strongly about the topic under scrutiny, the procedure would run the risk of not being seen as representative of the public or 'ordinary people' it was meant to lend a voice to (in particular by the political system, for which the outcome could be rather inconvenient due to its already communicated commitments). Therefore, it needed to be combined with a much more exclusionary parallel procedure of social re-

search (focus groups) rather than public debate as normally understood. In effect, in order to secure the credibility of *inclusion*, procedures of *exclusion* were necessary.

Somewhat ironically, the procedure meant to enhance the democratic will formation via inclusion needed exclusionary measures to establish its credibility in the eyes of the political decision makers (i.e. 'voluntary' all-inclusion was not considered to be representative by itself). In addition, the process aimed at establishing and certifying cognitive knowledge to underpin decision making, which was based on a high degree of exclusivity (allegedly only top qualified scientists were admitted), needed to make use of inclusionary measures to establish its own reliability in the eyes of the wider society. This observation does lend some credibility to arguments pointing out that the social robustness of knowledge tends to take on greater importance in technological controversies. In this case there were particular demands on the social configuration of knowledge production for the knowledge to be considered socially robust, i.e. credible beyond the scientific community and thereby useful for policy makers. I contend that these issues concerning the effects of particular configurations of inclusion and exclusion – which can arguably be understood as a more general formulation of the problem of representativity – warrant particular attention when analysing the emergence and effects of participatory procedures as a specific mode of managing technological controversies. Therefore, this issue will be taken up again in the comparative section. As the British case shows, the problem of inclusion concerns issues of the 'representativity' of the communication produced in the procedures (i.e. what the social composition of the participants should be) as well as issues of competence (i.e. what knowledge claims are to be included and how these ought to be balanced against each other). This second point regarding the confrontation of different knowledge claims will be particularly evident in the case to be considered in the next chapter.

Chapter VII

The Problem of Mediation – The German Case

In Germany as in other West-European countries the development and introduction of various applications of biotechnology has generated and released a significant societal conflict potential.[274] The issuing controversies have unfolded in different social and thematic dimensions, and a semantic of participation and deliberation has also played a significant role in the attempts to establish a broadly accepted social management of the technology in the German context.

In some ways the German experience is similar to that of other European countries, including Denmark and the UK, as the same technical innovations were appropriated and many of the same themes have been played out in the public sphere. In other respects, however, it exhibits specific traits originating in the German political culture and institutional arrangements. Arguably, just as in the other cases, there is also a certain path-dependency to the treatment of the thematic by the German public, which means that 'public' communication on the topic in the present and immediate past can only be rendered comprehensible against the background of a more extended temporal perspective – including previous experiences with participatory and deliberative mechanisms. I shall attempt to outline the most important aspects of this development in the present chapter, and I will look closely at one specific initiative which falls among the kinds of communicative processes explored in this thesis.

The central interest will be a discursive and participatory procedure initiated by the Ministry for Consumer Protection, Nutrition and Agriculture (Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft, henceforth BMVEL) in 2001 which took place between April and July 2002. This procedure involved 30 organisations from various sectors of society, which were all in one way or another involved in or affected by the development, application and discussion of modern biotechnology in agriculture or food production. This particular procedure has been chosen both because it is the latest in a number of processes and procedures aimed at mediating between different perspectives in the social management of biotechnology in Germany, and because it represents another way of establishing specialised communicative procedures for addressing technological controversies in the mode analysed within the framework of this thesis. As such, an analysis of this

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[274] In the following 'Germany' will be taken to mean West Germany for events taking place before the reunification in 1991. This focus on West Germany is unavoidable for two reasons. Firstly, there was to my knowledge very little recombinant DNA research undertaken in the GDR, it was not a 'public' issue and very little social scientific research on the social management of biotechnology in the former East Germany exists on which enquiries could be based. Secondly, all regulation of biotechnology after reunification has been based on the West German regulatory framework and discussion, which has since the early 1990s been closely tied to EU regulation.

procedure will hopefully contribute to the general aim of the thesis, namely to understand in more detail the ways in which public controversies over biotechnology are carried out at the societal level by the differentiation of specialised communicative contexts and semantics of participation. The procedure, dubbed *Diskurs Grüne Gentechnik* (discourse on green biotechnology, henceforth DGG), did not entail the active participation of lay members of 'the public' as observed in the two previous cases. However, it still represents an alternative to traditional technology policy-making, in which 'the public' and publicity constitutes a specific mode of observation and induces a particular kind of social dynamic. As will be discussed throughout the chapter, the particular shape of the event is characteristic of, on the one hand, German political culture in general, and, on the other, the way the controversies about biotechnology have evolved in Germany. Through comparison with the other cases it will hopefully contribute to generating knowledge on such procedures more generally. As it is approximately contemporary to the other cases, it can be considered comparable in terms of the substantial issues addressed, and can therefore be seen as an organisationally different response to the 'same' social challenges from a new technology.

As argued above, the discursive procedure initiated and sponsored by the BMVEL did not take place in a topical or social vacuum. Hence, as in the other cases, partly in order to understand the context of the procedure to be investigated, and partly in order to allow a more extensive comparison with the other cases, the regulatory and political history of the event will be traced in broad terms. This will be tackled in two parts. First, I shall characterise in general terms the biotechnology debate and regulatory developments in Germany. Second, some pages will be devoted to previous PTA procedures in the biotechnological domain. Although it will be argued that these in fact had little impact on the regulation of biotechnology in Germany for various reasons, they are interesting in the present context as they arguably provided important experiences that flowed into the shaping of the procedure of interest here. These procedures have been thoroughly described and analysed in the social scientific literature and have therefore not been made the object of independent research here. They will, however, serve as a contrast to the procedure to be traced in more detail, as they are telling about the challenges to mediation in technological controversies. Building on the description of the DGG, another section will focus on some more analytical perspectives on the discursive frames operating in the procedure and their consequences for the dynamic of the German biotechnology policy arena. This analysis will facilitate a characterisation of the procedure according to the scheme for comparing the cases developed in Chapter IV. One issue, which is particularly pronounced in this case, is what I shall call the *problem of mediation* between diverging framings of the technologies in question in cognitive as well as normative respects. The problem of mediation will therefore be introduced with in this case, and subsequently be unfolded in relation to the other cases as well in a final chapter.

The Emergence and Shaping of Biotechnology as a Regulatory Issue in Germany

The German political context can in general be labelled neocorporatist (Hampel et al. 1998: 63). Since the restructuring in the wake of the Second World War a political culture developed with an aversion to plebiscitary forms of politics, an extensive sectorial self-regulation and a strong role for interest organisations in policy making. For a relatively long time the regulation of biotechnological research in Germany remained exclusively in the hands of the relevant professional communities. Only the organisations of the scientific system responded to the initial whistle blowing incident within the scientific community at the very beginning of research on recombinant DNA. After the second Asilomar conference, where guidelines for genetic research were formulated and adapted into regulation by the US National Institutes of Health, the *Deutsche Forschungsgemeinschaft* (German Research Society) proposed that similar guidelines be issued for recombinant DNA research in Germany. Following this request from the scientific community the *Bundesministerium für Forschung und Technologie*, the BMFT (Federal Ministry for Research and Technology) issued guidelines in 1978, which were by and large an adaptation of the NIH guidelines, and also established a *Zentrale Kommission für Biologische Sicherheit*, ZKBS (Central Commission for Biological Safety) (Hasse and Gill 1994). Attempts at the time to legislate in the area failed due to strong opposition from the scientific community. Instead, extensive self-regulation by the molecular biological scientific community, to which the public had virtually no access, was established (ibid: 258). The purposes of this early regulation were twofold, namely to prevent accidents from experiments with biological processes and to buffer the research from public scepticism (ibid.).[275]

Initially, the fulfilment of both aims was apparently achieved. This can partly be attributed to the relatively low interest of the German chemical industry in these new technologies. For quite some time most of the research on recombinant DNA undertaken in Germany was conducted within public research institutions and on a small scale (Hampel et al 1998: 64). In fact, it has been argued that the main impulses for the promotion of biotechnological research came from the BMFT, i.e. that the state was the most active promoter of research and development in the field, whereas German industry was rather hesitant to take on these new technologies. Therefore, regulatory intervention from the state took the form of support rather than restriction (ibid, Gottweis 1998: 129pp). However, in the early and mid 1980s environmental organisations and other NGOs developed a more active interest

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[275] Here the virulent controversies over nuclear power in Germany played a significant role in at least two respects. The scientific community was made aware of the importance of public perceptions and was concerned about the difficulties of communicating highly technical topics to a broader audience. At the same time ongoing activity in the nuclear power debates and other environmental issues consumed most of the mobilisation potential in the social environments from which the social movements recruited their activists, which initially meant less attention was devoted to concerns about biotechnology.

in these new technologies. This contributed to the placing of biotechnology on the public agenda not only as a promising technology of the future, but also as a potential generator of ecological, social and ethical risks (Gottweis 1998: Chap 5, Hampel et al 1998).[276]

It was against this background of rapidly growing expectations in the scientific and technological potential of the new biotechnologies among organisations in science, government and industry as well as parts of the public, and growing concerns in other parts of society ecological risks, socio-economic effects and the transgression of ethical borders, that the issues were taken up in a broader manner by the political system.

The thematic expansion of political interest in biotechnology from something to be (uncritically) promoted to something that required more extensive political guidance was sparked by the arrival of the Green Party, which had developed out of the environmental movement, in the German political system. More specifically, this happened in a large-scale parliamentarian technology assessment exercise running from 1984 to 1986, initiated by *Die Grünen* (with the hope of banning most applications) in agreement with the Social Democrats (who were more focused on weighing risks and benefits). This *Enquete Kommission* was half made of parliamentarians in proportion to party representation, and half by various experts in the natural, social and legal sciences as well as philosophers and theologians.[277]

The work of the Commission (called *Chancen und Risiken der Gentechnologie,* altogether some 400 dense pages) entailed a substantial overview and discussion of the state of scientific knowledge at the time as well as considerations of potential future applications of the various branches of the research (Bundestag 1987). It entailed detailed discussions of potential sensitive ethical issues, in particular in the human domain, as well as legal implications and requirements. Furthermore, it produced a long list of recommendations for the Parliament in regard to research, technology and regulatory policies in a number of domains, as well as assessments of the possibilities of dealing with the various challenges and controversies through legislative and legal means. Most of these recommendations were shared by the entire commission except for the representative of *Die Grünen.* As the Greens realised that they would not be able to present their point of view with the force desired in the work of the commission, they changed strategy and started using the work as a platform for public mobilisation against gene technology (Hampel et. al. 1998: 65). In this process the political

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[276] In the German context prospective applications in the human domain proved especially controversial and gave rise relatively early to more fundamental discussions in an ethical mode about why and how the dignity of the human must be protected in light of the plethora of potential applications of biotechnology. This is often ascribed to the historical heritage of Germany, which allegedly makes biotechnology particularly vulnerable to a discursive linkage with (national socialist) eugenics (see for instance Gill 1996: 176).

[277] The *Enquete Kommission* format is a particular working form of the German Parliament whereby important and complex issues (*bedeutsame Sachkomplexe*) can be explored by parliamentarians with the assistance of experts, and suggestions to the Parliament can be made. The format serves as a 'minority right' to raise issues in the Parliament as only a fourth of the representatives must be in favour to initiate a commission (Reister 1997: 61).

frontlines, which would characterise much of German biotechnology politics and policy in the years to come were defined. This can be described as a confrontation between a 'mainstream' or 'hegemonic' discourse emphasising the potential for innovation and growth and a 'counter' discourse emphasising uncertainty, the difficulties of risk management and the potential adverse social and cultural implications of the technologies (Gottweiss 1998). The then governing Christian Democrats were the most positive towards the applications of the new biotechnologies and focused on the potentials for innovation, emphasising that no inhibitions should be placed on the growth and competitive edge of German industry. The Social Democrats in opposition were likewise concerned about economic growth and the safeguarding of jobs. However, they took a more risk averse approach to environmental and consumer protection than the Christian Democrats, and envisioned a more substantial role for state intervention in either furthering or delimiting certain technological trajectories according to politically negotiated perceptions of societal needs and benefits.[278] The Green Party decided to take an individual point of view and was given a separate chapter, in which many of the assumptions and recommendations in the report were critically discussed, concluding that gene-technology basically ought to be rejected as a viable path of social development. It can be argued that this rather polarised approach has remained a defining feature of the German biotechnology debate ever since.[279]

The commission's report was a defining technology assessment in the German context in the sense that it set both the political agenda for debates about biotechnology in the following years and its recommendations formed the basis of the first German law on gene technology, which was issued a few years later.

It has been noted that a significant discursive effect of the work of the *Enquete Kommission* was that a substantial differentiation was established in the political communication between the different applications of recombinant DNA knowledge, research and application that had to that point existed as a unitary subject. This meant that in several domains risk averse 'decision blockades' with reference to undefined or hypothetical risks were no longer a viable political option (Gloede 1997: 104, 118). In this sense the commission both drew some central lines of political confrontation, which remained controversial, but also paved the way for a step-by-step introduction of the technology into society through the political acceptance of a '*Sozialadäquanz des Restrisikos*'[280] and where adequate regulation was

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[278] Although the specific recommendations of the report are carried by the entire commission except for the representative of *Die Grünen*, a minor section is devoted to the expression of particular viewpoints on the preferable role of state regulation, especially in the formulation of research policies (Bundestag 1987).

[279] One observer described the German debate as characterised by a strong '*Freund/Feind*' trait (Interview, Gill), a description that was more or less present in several of the interviews. See also Gill 1996: 175, where it is argued that "The opposed sides in Germany are fighting to win, not to compromise".

[280] Literally 'Social adequacy of risk residues', i.e. that risks that cannot be adequately legally regulated either due to knowledge deficits or a lack of suitable risk management methods, but which are considered to be

put in place. This broad mode of assessment qualifies the German approach as 'programmatic' (see Chapter I)

Although the *Enquete Kommission* finished its work by late 1986 no legislative initiatives were taken immediately in regard to deliberate releases of GMOs, again due to opposition among the scientific community and to some extent industry. It was not until the political system was in 1989 'forced' to take action as signals from the legal system indicated that the area was insufficiently programmed, that legislative work gained momentum and the scientific community and industry accepted that a legislative framework was urgently needed (Gottweis 1998: 280-88).

This realisation occurred in November 1989 when the administrative court in Hessen, following a complaint from a citizens' initiative, ruled that a construction permit granted to the company Hoechst to build a production facility for genetically engineered insulin could neither be given nor denied on the basis of existing environmental legislation. The court ruled that given the cognitive uncertainties and social controversy surrounding such technologies, a clear signal from the legislator was required. Following this, the first German laws on genetic engineering (Gentechnik Gesetz, henceforth GenTG) was rapidly prepared and passed entering into force in July 1990.

The law had a dual purpose: 1) to protect humans, animals and the environment from risks and 2) to create a legal framework within which gene technology could be applied and promoted. As such, the law was an attempt to both appease the sceptics and 'make the technology happen'. However, neither sceptics nor advocates were particularly happy with the law. The sceptics were unhappy because it allowed and supported a technological development they held should be fundamentally rejected, the advocates because they considered the regulation to be too restrictive.

Of particular interest in this context is the fact that the law prescribed that permissions for deliberate releases of GMOs should be preceded by public hearings (*Erörterungstermine)*, where objections were to be discussed orally among applicants, objectors and responsible authorities. In the initial period of legal regulation, which can be described as programmatic, this provided an important avenue for the manifestation of public discontent and concerns (Bora 1998, 1999).

In the following general elections *Die Grünen* lost all seats in the Parliament and the GM sceptics lost an important political platform. At the same time the proponents criticised the GenTG for being hostile to innovation. This was a forceful argument in the wake of German reunification and the revision of the law in 1993 was driven almost exclusively by deregulatory intentions, and was perceived by the promoters as a step towards the 'normalisation' of the technology.

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negligible, are accepted by society because the benefits from the applications of the given technology are considered to outweigh remaining risks.

The revision included the abolition of public hearings, which in the meantime had proven to be platforms of resistance to the technology and did not fulfil their intended purposes. The hearing rights were turned into written procedures, which were considered to be a significant reduction of the participatory element in regulation (Bora 1994).

The passing and revision of the GenTG aimed to balance the political intention to further the development and application of biotechnology in Germany and the widespread hesitation and concern amongst the public, expressed primarily by environmental organisations and through survey research. However, neither the public hesitation nor the organised resistance engaged in attempts to (re-)politicise the question of whether Germany should accept genetic engineering ceased (Gottweis 1998, Gill 1996, Hampel et al 1998, 2002). Although a certain 'softening' of the fronts allegedly took place in the mid 1990s (Barben 1997), most issues remained fundamentally contested and were re-invigorated as commercialisation was approaching.

To summarise the observations so far: as concerns over recombinant DNA research first emerged, the affected German scientific communities initially attempted – and largely succeeded in – retaining control over the regulation of their activities. However, as the request to the political system for more resources to stay competitive coincided with the growing political influence of the environmental movement through *Die Grünen*, this situation changed significantly. Significant involvement in the assessment of the emerging technologies by the political system led to heightened public attention, a comparatively strict (though not prohibitive) regulation and a comparatively highly polarised climate in the political system as well as in the wider German public.[281] It was in this context that various organisations launched initiatives to engage with different aspects of biotechnology in participatory and deliberative modes. Some of these, I contend, provided experiences, which made up the background for the DGG procedure to be analysed here. Therefore, I shall devote some attention to them.

Organised Participatory Assessments of Biotechnology in Germany

One more or less direct effect of the *Enquete Kommission*'s work was the realisation by the parliamentary system of the need for a greater capacity to process technology assessment issues. The establishment of a TA institution modelled on the American example of the OTA had been discussed for a long time in the German political system without any conclusion, primarily because the conservative CDU/CSU coalition feared that this would curb innovation and thereby inhibit Germany's competitive capacity. However, the experiences with the commission on biotechnology allegedly turned opinion around (Simonis

[281] It should also be that the legal system – the courts – seem to have played a greater role in shaping regulation than in the other cases examined.

2001: 441, Ropohl 1996: 176-80). This led to the establishment in 1990 of the *Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag (TAB)*. The organisation reports to the Parliament's standing committee on science and technology, and since its birth biotechnology and the acceptance of technology had been one of its central areas of work. The TAB primarily undertakes 'traditional', expert based technology assessments, forecasts and monitoring tasks.[282] As such, it primarily serves as one among many channels through which the political system attempts to keep itself cognitively equipped to register and respond to technological issues. Although discourses on and methods for public participation and discursive procedures have been present in the German TA community for quite some time (significantly influenced by the reception of Habermasian ideas about communicative rationality, see Renn et al. 1995, Körbele et al. 1997), the German political system has been quite hesitant in using these ideas on a more practical level.[283] To the extent that the TAB has worked with participatory methods this has not involved members of the lay public as such, but has been shaped as stakeholder participation.

As a political compromise to appease *Die Grünen* after GenTG entered into force thus permitting some (restricted) research on and application of GMOs, one of the first tasks of the TAB was to undertake a technology assessment process on 'biological safety'. Here a participatory approach involving a number of stakeholders was chosen by the TAB. However, briefly after the decision to undertake the TA project, the Green Party lost the election and was no longer represented in the Parliament. Therefore, the political addressee of the project disappeared, and as the majority of the political system was sympathetic to the request from science and industry to have the regulatory burden on GM research and application lightened, the thematic of 'biological safety' appeared as inadequate for a 'symmetrical' discourse between two opposite stakeholder viewpoints (Gloede 1997: 107-8). The fundamental question at the centre of the discursive process, that is whether risks from GMOs should be considered in an 'additive' or 'synergistic' perspective was no longer politically relevant as the 'go ahead' had already been given for biotechnological development. Hence, according to the organisers, the participants did not really engage in argumentative confrontations, but primarily in strategic and positional communication (ibid). The effect was that the project had virtually no effect on political communication (ibid: 110).[284]

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[282] An employee at the office told me that there is a certain interest among the employees in public participation methods, but such methods receive a somewhat mixed reception by the parliamentary committee in charge of the office's work. The office has published some methodological considerations on (public) participatory and discursive procedures as TA tools, but have not applied such methods to any significant extent.

[283] A hesitation which has been ascribed to both a constitutional prohibition as well as a rather deep-seated reservation against plebiscitarian forms of politics.

[284] This was further underlined by the fact that the project was ended in August 1993, which practically speaking did not allow any effect on the revision of GenTG, which was proposed in May and passed in November 1993.

Whether this unsuccessful participatory technology assessment project is to blame or not has not been investigated, but since this incident the TAB has not (as far as I have been able to establish) applied participatory or discursive procedures in its assessments on biotechnology, seeing itself instead as a provider of (politically relevant) expertise. However, other such attempts have been undertaken by organisations further removed from the political system.

Probably the most significant and ambitious event in the German technology assessment of plant biotechnology before the DGG was a discursive and participatory technology assessment experiment on herbicide resistant crops carried out at the *Wissenschaft Zentrum Berlin für Sozialforschung* (WZB) in the period from February 1991 to June 1993. This discursive procedure is interesting for the present purpose for two reasons. Firstly because it can itself be considered as a significant example of the kind of procedures being investigated here, namely an attempt to manage technological controversies through inclusion and argumentation in specialised organisational forums at the interface between several functional systems. As such, it has been the object of significant interest in the research literature.[285] Secondly, because it constitutes an experience of discursive technology assessment in Germany, which, I contend, forms part of a social learning process feeding into the procedure to be traced in more detail in the following.[286]

The WZB project was deliberately formulated as an 'experiment' with accompanying sociological research and evaluation, whose aim was to investigate to what extent conflicts over a controversial technology could be resolved through a discursive process with two central characteristics, namely that it should be based on scientific argumentation (exchange of cognitive knowledge claims rather than political campaigning) and that the process should be controlled by the participants themselves, i.e. there should be no third party present to make decisions on the quality or relevance of the outputs (van den Daele 1996).

With a conscious and explicit Habermasian inspiration, the procedure was designed to investigate if, under what circumstances and to what extent technological controversies, which in the mass mediated public sphere usually consisted of the announcement of standpoints and symbolic issue framings, could be mitigated through discursive rules and the 'coercion' to proceed argumentatively. The project was, in other words, framed as a real-world test of the force of the 'better argument'.

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[285] The project has inspired a significant amount of social scientific analysis of various aspects of the procedure by researchers involved in the organisation of the project (Bora and van den Daele 1997, van den Daele 2001, van den Daele and Neidhardt 1996, van den Daele et al. 1997) as well as a number of external observations and criticisms (Gill 1996, Gloede 1997, Skorupinski and Ott 2000, Gloede and Hennen 2002).

[286] One indication of this influence is that in the 'Process Report' from the moderator of the *Diskurs Grüner Gentechnik* the WZB experiment is mentioned as a predecessor and a comparison is undertaken between the two processes (Hammerbacher 2003).

For this purpose representatives with scientific competence from public research institutions, industry, environmental organisations and regulatory officials were invited to participate. Both industry representatives and environmental organisations were rather ambivalent about participation but in the end agreed. Altogether approximately 60 persons participated over the 2½ years the procedure lasted.

Even if this procedure was organised as a technology assessment experiment and had no direct link to either political or regulatory decision-making, the organisers were well aware that it entailed significant 'discursive risks' for some of the participants (van den Daele et al. 1997: 2). However, it was not easy publicly to justify non-participation, which could be taken as an indication of the inability to support a position with arguments. In order to protect participants against such discursive risks the fact that the procedure was 'process-oriented' rather than 'result-oriented' was emphasised (ibid: 9). It was not clear beforehand what conclusions were to be reached or whether they could be reached (consensually) at all.[287]

The procedure was explicitly technology induced. A particular application of genetic modification was to be assessed (herbicide restistance), it was not a process to identify and compare alternative agricultural technologies. This was criticised by the gene technology sceptics in the process, but was considered as an issued pre-determined by the research funding application and the organisers insisted that this feature could not be changed by the participants (ibid.).

The technology induced approach had the effect that the main focus of the procedure was on the potential risks of introducing herbicide resistant crops into German agriculture, neither on the potential benefits arising from such an introduction and possible alternative technologies (van den Daele et. al. 1997: 5-6). The procedure was organised with a primary focus on the cognitive dimensions of risks, i.e. establishing adequate models for assessing them and providing empirical evidence for what physical risks existed, how likely they were to occur etc. This proceeded from the assumption: "Before we ask whether a risk is acceptable we have to ask whether the risk exists" (ibid: 9). As such, the organisers and moderators attempted, in the first instance, to screen off the discursive procedures from political, economic or ethical arguments and focus on cognitive dimensions, in short to differentiate the appraisal of facts about the physical characteristics of plant manipulation from the confrontation of values. The procedure can hence be interpreted as an attempt to funnel a broad social controversy into a more narrow substantive dimension and solve at least aspects of it using argumentative means. Arguably, however, in reality this meant that issues

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[287] In order for such a process to work all steps were in principle to be taken consensually by the participants. This of course provides some logistic problems for a group of 60 people, and a certain moderator and steering function had to be established. But according to the organisers, all major decisions of both procedural and substantial character were supported or at least silently accepted by all participants until the near end of the procedure (Bora and van den Daele 1997: 126-27).

of risk acted as a proxy for the fundamentally different evaluations of the need and desirability of GM technology (cf. Chapter I).

This approach was by no means uncontroversial among the participants, who clearly had 'procedure-external' interests in what results the procedure would produces as well as differing ideological commitments. Although the controversies about biotechnology are not only of a cognitive nature (regarding the existence and magnitude of risks), cognitive aspects certainly constitute an important argumentative resource in the public sphere. The environmental organisations in particular were sceptical of a process where scientific argumentation would be the central mode of communication, which for other participants was as *sine qua non* condition for participation. However, as procedural fairness – including a undistorted access to resources – was acknowledged as a central prerequisite of a successful discursive procedure, they were provided with means to commission scientific reports from experts believed to be sympathetic to their viewpoints.

The discursive procedure then proceeded on the basis of arguments and counter arguments on the existence and significance of various risks as the central themes. When a certain string of arguments was exhausted, the matter was considered as settled by the moderators if no objections were raised, which were supported by arguments. A central bone of contention in this process was whether GMOs carried risks that were peculiar to transgenetic organisms, or whether the risks they could entail were of the same 'nature' as those arising from conventional breeding techniques. In effect this can be seen as a 'scientification' of some of the differences in worldviews that, as I argued in Chapter III, are at the root of many of the controversies observable in the European publics.

In the course of the procedure there was allegedly a tendency towards sceptics running out of arguments and evidence of why the herbicide tolerant GMO techniques should entail particular risks or risks of a different magnitude, which would require that they were either banned or need particularly strict regulatory approval and oversight.

At the end of the procedure, before the final conference where results were to be summarised and made public, the environmental groups decided to leave the procedure (ibid: 16). They allegedly did so on the grounds that the process was taking up too many resources, that the participants from industry had undermined the purpose of the process by applying for research releases during the process, that they were flooded with documents and that the WZB working group had been biased in a pro-GM direction. In the assessments of the organisers the decision of the environmental organisations had more to do with the fact that the discursive procedure was about to undermine a significant argumentative resource of their campaign, namely that genetic engineering entails 'special risks' of a qualitatively different nature from traditional plant breeding and that the knowledge-base was insufficient to make reliable estimates concerning ecological effects arising from large scale deliberate releases. The environmental groups had not been able to substantiate this assumption

in the discursive procedure and therefore felt uneasy about backing the result of the technology assessment.

As no consensual result was achieved (for whatever reasons), the discursive procedure could not be considered a success.[288] However, it must nonetheless be considered a central PTA exercise in the German context due to the attention it received from TA practitioners and the academic community.

Although the WZB procedure was criticised for being overtly expert based and reductionistic in its focus on specific, identifiable physical risks, and thereby effectively de-legitimised concerns based on other reasoning, it did seem to dampen the enthusiasm for participatory procedures in the biotechnology domain in Germany – at a time where such ideas were arguably gaining momentum elsewhere in Europe. GM sceptics were particularly hesitant to be tied into such procedures if they were to 'fight' organised, mainstream science on its own turf. Instead they sought other avenues to further their viewpoints.

The procedure was initiated and carried out primarily as a 'social experiment', without any specific political or regulatory aim beyond the cognitive and social learning processes instigated in the participants. Therefore, the impacts were, perhaps due to the failure to produce a consensual output, which could have legitimated new political initiatives, rather limited. As such, the procedure remained a communicative event, which, although in principle central to the social controversy about gene technology, created relatively little resonance and has remained invisible outside the specialised sub-publics of biotechnologist and (P)TA practitioners, where disagreement still exists in regard to whether the procedure should be interpreted as a misguided attempt to 'scientificate' a technological controversy with a much wider scope or a demonstration that argumentative agreement is unlikely to be reached on such issues.

Although the legal codification of biotechnology regulation in Germany is located at the federal level, a significant amount of factors, which are decisive for its application are situated at the *Länder* level. Therefore, there have also been attempts to undertake technology assessments and mediate controversies over biotechnology at the regional level. One institution and its work on technological controversies deserves special attention in this context. This is the Academy of Technology Assessment in Baden-Württemberg. The academy was considered as one of the main organisational loci of the technology assessment community in Germany (until it was shut down in 2003). The academy has worked quite exten-

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[288] Allegedly, this did not surprise the organisers who note that: *"Procedural fairness is the essence of participatory technology assessment. If this principle is violated then withdrawal from the procedure can be expected and is legitimate. However, one cannot legitimately withdraw from a fair procedure simply because the emerging results contradict ones own strategic interests. Nevertheless, in terms of "Realpolitik", withdrawal must be expected in such a case, too. It must also be expected that arguments refuted in a participatory technology assessment will nevertheless continue to be used outside and after the technology assessment, as long as these can still impress the public."* (van den Daele et.al. 1997: 19).

sively with participatory and discursive procedures in conflict mediation in various technological domains, in particular pertaining to local planning and the location of waste incinerators, chemical industry plants and the like. It was an integral part of the Academy's working philosophy that the active involvement of all persons affected (*Betroffene*) is increasingly necessary to maintain the acceptance and legitimacy of technological decision-making.

As part of a larger TA project commissioned by the local government in Baden-Württemberg in order to assess the potential for the growth of a biotechnological sector in the *Land*, the TA Academy undertook a Citizens' Assessment (Bürgergutachten). The background was not only a political wish to know what potentials the technology held for the regional economy, but also an acknowledgement that:

"*Gleichzeitig besteht in der Gesellschaft derzeit kein Konsens darüber, auf welchen Gebieten und in welchem Umfang gentechnische Verfahren eingesetzt werden soll. Die unterschiedlichen Argumente und Haltungen müssen in geeigneter Weise in Verfahren des gesellschaftlichen Diskurse aufgegriffen werden.*" (Grabe and von Schell 1995: I).

The aim was hence to investigate not only what the growth and innovation potential for various biotechnologies in the *Land* was, but also "*welche spezifischen Anwendungen von gesellschaftlichen Gruppierung bzw. den Bürgern des Landes gewünscht order abgelehnt werden oder wie die Rahmenbedingungen von Anwendung aus der Sicht der Bürger ausgestalten werden sollten*". (Garbe and von Schell 1995: II).

The part of the TA project involving 'the public' consisted of two elements. One was a series of *Werkstattgespräche* ('workshop dialogues') involving various organised stakeholders, the other was an attempt to 'involve (einzubinden) non-organised citizens in the societal discourse' (ibid.). The public involvement in this project was based on a methodology called 'planning cells', developed in Germany since the 1970s, primarily to be applied in local planning contexts.[289]

In this case 194 randomly sampled citizens from three locations in Baden-Württemberg participated in groups of around 25, who heard various expert presentations and debated for a total of four working days. The scientific experts were deliberately selected 'in pairs' to represent 'conventional' and 'critical' perspectives respectively (ibid: 29). This indicates a perception that the recognition of both cognitive and normative uncertainty surrounding a number of aspects of biotechnology must be dealt with in the social dimension by presenting the assessors, the lay citizens, with diverging perspectives.

The moderators encouraged the participants to make several individual and collective assessments of various issues surrounding the use of biotechnology in agriculture and food production, including the social management of risk and uncertainty, regulatory issues,

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[289] The procedure shows significant similarities with the Danish consensus conference model described earlier, where the central element is the confrontation of expert knowledge and lay people's value judgements (Abels and Bora 2004).

economic importance and potential ethical problems pertaining to the application of biotechnology (ibid: 1).

The *Bürgergutachten* did not produce a single consensual statement, nor did the individual groups. However, the report from the TA Academy included a number of statements of opinion from the participants, which were dominantly sceptical towards the application of biotechnology in agriculture and food production.

The results of the entire TA project were delivered and presented orally to the state legislature in Baden-Württemberg. According to a later assessment, however, the *Bürgergutachten* had virtually no effect on the subsequent formulation of a biotechnology policy for Baden-Württemberg. This has sparked some criticism that the involvement of lay citizens is primarily "a symbolic appendix attached to the exploration of economic opportunities" (Gloede & Hennen, n.d.), and that the forum, despite the intentions of the TA Academy, primarily functioned as a processor of lay attitudes towards biotechnology as an 'acceptance problem'. The fact that, just as in the Danish case, the results indicated that 'ordinary citizens', when given the opportunity, are able to make informed and reasoned assessments, is something registered in the social scientific community already sympathetic to the idea – and not in the political system or elsewhere.[290] The public participatory branch of the technology assessment project seemed to have emerged from an interest in such procedures by the TA Academy rather than in the political system. Once suggested, however, it was probably not easy for the political organisation commissioning the TA project to decline, but neither did it entail any commitment for it to respond or commit to the results. It seems that in this case the kind of knowledge communicated at the end of the process found little resonance outside the TA community.

In an abstract perspective the three procedures briefly reviewed here can all be seen as examples of what this thesis has set out to explore, namely the development of certain organisational forums whereby modern societies, in this case Germany, have attempted to confront and manage some of the social challenges posed by the introduction of a technology which is observed from different positions in society in divergent manners in regard to its desirability and potential risks.

Arguably, the procedures largely subscribed to the same discursive and participatory semantics, but they express some quite distinct selections when turning these ideals into practice. Most observers agree that none of these procedures were particularly successful in terms of the criteria set by their self-descriptions and the normative discourses on participation and deliberation – and that they were not particularly effective in terms of influenc-

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[290] This is of course a statement which is difficult and quite demanding to 'prove'. It should be understood as my reading of various observations of biotechnology politics in Germany, where I have been able to trace virtually no reference to the outcomes of the *Bürgergutachten*.

ing the regulation of biotechnology in Germany. In short, they achieved a limited resonance.

As mentioned all have been the object of various social scientific observations, analyses and evaluations, and therefore I shall not go into more detail on these procedures. I have chosen to dwell on them a little in this context because they 1) are telling about the place of such procedures in the German biotechnology policy arena, and 2) they are experiences which to some extent have shaped that arena and thereby the context in which the process I shall examine closer in the following emerged and unfolded. In the following account and analysis they are therefore meant to serve as backgrounds for the procedure under scrutiny.

Before moving on to these more detailed empirical observations it might be beneficial to summarise the lessons that may be drawn about the broader German context from the examination of the three procedures.

The manner in which the three procedures operationalised the underlying participatory and deliberative ideals indicates a significant Habermasian influence in terms of the importance ascribed to procedural fairness and argumentation in (predominantly) cognitive modes. However, the avoidance in both the TAB and the WZB projects of including lay people – and so attempting to keep the deliberations in 'expert-language' – can perhaps be taken as an indication of a disinclination in the German political culture to engage with what is seen as more egalitarian or plebiscitarian forms of politics.[291] It is to a growing extent acknowledged that technocratic and exclusionary modes of policy formulation in this domain are unlikely to create acceptance and that participatory and deliberative modes of communication do seem to have an inherent appeal in modern societies when it comes to 'inter-systemic' coordination problems under public scrutiny. In Germany the operationalisation of such procedures has, however, been adjusted to the predominantly corporatist political culture – what in the cultural theoretical approach discussed in Chapter III arguably leans towards a hierarchical bias when considered on the macro-level of shared political culture and institutional arrangements (as is also indicated by the 'programmatic' and legalistic type of regulatory approach opted for in Germany as discussed in the previous section).

Perhaps because participatory and deliberative semantics have an inherent appeal in modern societies, apparently extending into organisational contexts with predominantly 'hierarchical' tendencies, when the prospect of lifting the moratorium at the EU level again called for political decision and legal codification on a number of issues pertaining to the expected commercialisation of GM products, the German political system in 2001 made a call for a 'societal discourse', which led to the process I shall now examine in more details.

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[291] The *Bürgergutachten* did engage lay people, but the fact that it was carried out more on the initiative of the involved TA organisation – rather than the addressees in the political system where it allegedly received sparse attention – arguably does support the general point about a hesitation to engage with lay participation in TA exercises.

Diskurs grüner Gentechnik – a Participatory Procedure in a Corporatist Setting

The 'discourses about discourse' and participatory procedures had their boom in Germany in the late 1980s and the first half of the 1990s. However, the TA community observed that experiences from local planning conflicts were difficult to transfer to the biotechnology domain in a way that would make their outcomes efficacious on the political level. The political system seemed loath to acknowledge the value of public participation that was not 'representative' or aligned to the corporatist political culture.[292] Among stakeholders too the experiences were assessed as unsatisfactory and it seems that a less optimistic period set in where fewer practical procedures were undertaken and more reflection initiated.[293]

Nonetheless, the perceived need for some kind of mediation between the different perspectives and concerns present in the German specialised and general publics had not ceased, and in the autumn of 2001 the BMVEL announced that it wished to instigate and organise 'a broad societal discourse' on 'green' biotechnology, its regulation, and its application in German agriculture and food production. For this purpose a number of organisations representing "*die gesellschaftlichen Gruppen, für die die Grüne Gentechnik von besondere Bedeutung ist...*" (BMVEL 2002a: 1) were invited to participate in the process, which ran for nine months from December 2001 to September 2002, when the 'results' of the discourse procedure were presented to the public. 30 different organisations participated in the procedure and a further 11 organisations were invited to participate in one or more sessions of particular relevance for them.[294]

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[292] This assessment is partly based on a conversation with an employee at the TAB (personal conversation, June 2003).

[293] This can be seen for instance in a growing amount of more critical assessments emerging from the TA community and academic circles.

[294] The 30 different organisations could according to the preliminary consultations undertaken by the moderation be categorised as belonging to one of five categories of basic attitudes to green gene technology, of which the following table offers an overview (Hammerbacher 2003).

Basically dismissive because of negative risk/benefit assessments and/or for ethical reasons	Arbeitsgemeinschaft Bäuerlicher Landwirtschaft e.V. Arbeitsgemeinschaft Ökologischer Landbau e.V. Bundesfachverband Deutsch Reformhäuser e.V. Deutscher Naturschutzring e.V. Greenpeace e.V.
	Die VerbraucherInitiative e.V. Katholische Zentralstelle für Entwicklungshilfe e.V. Rat der Evangelischen Kirchen in Deutschland Verbraucherzentrale Bundesverband e.V.
	Bundesverband des Deutschen Lebensmittelhandels e.V. Deutscher Bauernverband e.V. Deutsche Gesellschaft für Ernährung e.V. Gewerkschaft Nahrung-Genuss-Gaststätten Industriegewerkschaft Bauen-Agrar-Umwelt

In the following I shall describe and analyse aspects of the process according to the theoretical framework and comparative dimensions outlined in Chapter III and IV.[295]

As a starting point it seems desirable to look briefly at the immediately preceding political context, where a number of events and developments were defining for the arrangement and course of the procedure. Following the change of the German government to a coalition of Social Democrats and Greens in 1998, the Chancellor's Office, at the time presenting itself to be growth oriented and innovation friendly, initiated discussions with the biotechnological industry, farmers' organisations and the scientific community about launching a large-scale field trial experiment (not unlike the Farm Scale Evaluations in the UK) with the purpose of supporting the development of biotechnology in Germany. In these discussions there were also suggestions for public information and debate initiatives.[296]

These plans were relatively advanced when the news broke that BSE had been discovered in Germany. Until this point it had been argued that due to different agricultural practices

Proponents with reference to the pressure for action grounded in global realities	Bundesverband des Deutschen Groß- und Außenhandels e.V. Deutscher Raiffeisenverband e.V. Deutscher Verband Tiernahrung e.V. Verband Deutscher Ölmühlen e.V.
Proponents with reference to the benefits of gene technology	Bund für Lebensmittelrecht und Lebensmittelkunde e.V. Bundesverband Deutscher Pflanzenzüchter e.V. Bundesvereinigung der deutschen Ernährungsindustrie e.V. Deutsche Forschungsgemeinschaft Deutscher Industrievereinigung Biotechnologie Industriegewerkschaft Bergbau, Chemie, Energie Industrieverband Agrar e.V.

[295] The case is built on publicly available documentation of the event, primarily found at the Internet page established for the event. (www.transgen.de/diskurs, still operational 16.12.2004) as well as research interviews with the following persons:

Ruth Hammerbacher, moderator of the procedure, interviewed 25.04.2004

Gisbert Kley, member of steering committee, representing Bund Deutschen Pflanzenzüchter, interviewed 26.04.2004

Manfried Lückemeyer, 'Unterabteilungsleiter' in BMVEL, interviewed 27.04.2004

Helmut Röscheisen, member of steering committee, representing Deutsch Naturschutzting, interviewed 27.04.2004.

Heike Velke, observing member of steering committee, representing Deutsche Forschungsgemeinschaft, interviewed 27.04.2004.

Regine Wollersheim, 'Abteilungsleiterin' in BMVEL, chair of steering committee, interviewed 28.04.2004

Berhhard Gill, 'Privatdozent' in sociology, University of Munich, participated as expert, interviewed 04.05.2004).

[296] This, in terms of institutional responsibility, somewhat odd initiative must be seen in light of the fact that the Ministry of Health, which was then responsible for the administration of the GenTG, was headed by a green minister, who had little inclination to promote biotechnology in the agricultural sector. In fact, the minister had only abstained from supporting the EU moratorium due to internal pressure in the German government. Hence, the Chancellor's Office took over the political initiative in the policy domain.

from the UK and strict safety measures BSE was not a problem in German agriculture or a threat to German consumers. The news of BSE in Germany not only had a significant impact on consumer confidence in the food market, it also sent significant ripples through much of the political system.

The Social Democratic minister of agriculture resigned, the ministry was renamed the *Ministry for Consumer Protection, Nutrition and Agriculture* (BMVEL) in order to signal changed priorities and more independence from the agricultural sector, and the ministry was made responsible for the administration of the GenTG. The incoming minister was Renate Künast from *Die Grünen.*

At this point, the Chancellor's Office assessed that it would not be possible to simultaneously manage the restoration of public confidence in the wake of BSE and have a dialogue with the public about the risks and benefits of genetic engineering in agriculture and food production. As a consequence the field trials programme was cancelled.

Although the EU moratorium remained in place, both external and domestic pressures meant that the political system could not just ignore the topic altogether. Already prior to the BSE debacle the responsible ministerial department had been considering if and how some sort of public consultation on the topic could be initiated and supported along with the planned field trials. This idea was taken up by the incoming minister, who opted for a stakeholder discourse.[297] The motive for choosing this particular approach seems to have been a wish to explore the possibilities for political intervention among some relatively 'manageable' and stable organisational partners with credibility among their respective constituencies. Allegedly, the idea of lay participation was considered, but was abandoned quite early in the planning process, as it was taken for granted that the large organisations invited 'represented a wide spectrum of citizens'. One of the responsible civil servants explained:

> *"Öffentliche Debatte haben wir ein bisschen gefürchtet weil da der Sachverstand auch nicht so groß ist, wenn man einfach dort Leute einladen. Dieses ist doch auch eine Frage da muss man auch wissen was gentechnische Veränderung ist, sonst macht es keinen Sinn.... Wir sind also schnell davon abgekommen. Aber wichtig war uns von Anfang an über den Diskurs, und zwar über jeden einzeln Schritt, muss die Öffentlichkeit informiert werden, und das was in dem Diskurs – Basispapierer, Reader, Protokolle, die Ergebnisse – (eingegangen ist) darüber musste die Presse informiert werden. Und letztendlich ist ja eine öffentlich Bericht daraus gekommen, was da im Einzeln diskutiert worden."*[298]

Hence, the ministry decided against lay inclusion as they assumed that this would endanger the possibility of competent discourse. It was assumed that the broad spectrum of organisations included combined with a transparent process to which the wider public could be a relatively unhindered audience would ensure political legitimacy.

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[297] Interview with Unterabteilungsleiter in BMVEL Manfred Lückemeyer, 27.04.2004.

[298] Interview, Lückemeyer

The process took off with an opening event in December 2001 where Künast introduced the task of the process and presentations were given by two experts representing, respectively, an optimistic and a sceptical stance on the application of green gene technology. As such, it was acknowledged from the outset that – especially from the point of view of the political system – there was more than one 'truth' to be told about the issue. The invited groups were then encouraged to suggest themes they considered important to investigate and debate, after which a steering committee (*Lenkungsausschuss*) was appointed to set the terms and ground rules for the process and formulate the agenda for the discursive procedure. This steering committee was chaired by a representative from the BMVEL and eventually expanded to ten representatives of the organisations that had been most active in the public debate about green biotechnology thus far with a balance between protagonists and sceptics.[299]

Then followed a preparatory phase where the steering committee in cooperation with an external moderator from a consultancy prepared the actual discursive process. In this process it was decided – under what the moderator describes as difficult negotiations (Hammerbacher 2003) – what the thematic blocks of the discursive procedures should be and what experts should be invited.

In April 2002 a two day 'inspirational meeting' (*Fachtagung*) with presentations by a number of German and international experts on the themes to be investigated and debated was held to kick off the actual discursive process. Here approximately 140 people participated and the meeting was open to the press.

After this followed five 'rounds of discourse' (Diskursrunden) of two days each. These were organised in the following way: for most themes to be debated two experts were invited to give presentations and discuss with the participants. These experts were suggested and invited by the steering committee, which in effect meant that they were selected in equal proportion to present perspectives that were, respectively, positive and negative towards different aspects of GM applications. These sessions would be open to the press. Following this were sessions where discussions among the participants took place without any external observers present. In these 'rounds of discourse' approximately 40 participants took part. In these meetings "*wurden in nicht-öffentlichen Sitzungen Positionen zu den anstehenden*

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[299] Initially, the BMVEL expected to be able to steer the procedure itself in collaboration with the moderation. During the opening sessions it was suggested that a small executive of four people manage the debate. However, in order to ensure the collaboration of all important stakeholders, the steering committee was gradually expanded to 11 members before it actually began its substantive work. It was chaired by the responsible director from BMVEL, and the two 'sides' in the debate had an equal number of representatives. Some participants expressed concern that scientific expertise was not sufficiently included and the Deutsche Forschunggemeinschaft was given an observer's seat as well.

Fragen formuliert und diskutiert mit dem Ziel, Konsense, Dissense, zu klärende noch offene Fragen und Empfehlungen an die Politik und andere Akteure zu identifizieren." (BMVEL 2002b: 18).

At the end of the process a report was formulated by the moderator. After some modifications and negations this was approved by the steering committee and presented to the public in a meeting with the minister as the 'outcome' of the procedure. In this meeting the participating organisations were also given the opportunity to present their assessments of the procedure to the press and the minister.[300]

In the following my interest is not so much in the detailed content of the communication as it unfolded between the participants,[301] but more in the discursive frames underpinning the procedure and whether any effects from these framings can be established in the subsequent configuration of the policy arena. The central interest of the thesis is how 'the public' is operationalised in such communicative contexts differentiated and organised specifically at the 'borders' of the different functional subsystems. In this case no lay members of the public were included directly as active participants in the procedures, and the term public participation takes on a slightly different meaning. As such, the whole procedure represents a more corporatist approach to social conflict mediation than the other cases, i.e. 'the public' is assumed to represented by organisations from the different societal 'sectors'. Nonetheless, I will argue that 'the public' was virtually present in the communicative processes in the discursive procedure. However, the interests of 'the public' were clearly framed in different ways by the different participants, all of whom sought to fashion themselves as speaking on behalf of the 'true' public interest. Therefore, part of the aim of the following analysis will be to bring out the more implicit framings of 'the public' articulated in the procedure, giving rise to different demands to the regulation of biotechnology.

A defining trait of this debate was that the BMVEL was under the direction of a 'green' minister. She was placed between, on the one hand, a chancellor who was known to be relatively pro-GM and industry friendly, and, on the other, expectations from the grass roots in her own party and to some extent its constituency in the environmental movement.[302] This of course made the situation for the BMVEL somewhat precarious in terms of making the discursive procedure acceptable to all potential participants, especially the organisations sceptical of the motives of a green minister. Hence, this case in a way 're-

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[300] As part of the publicity work all agendas, expert presentations and minutes of the discussions were made available through an Internet site. Furthermore, the BMVEL produced a booklet with a report of the whole procedure and the most significant outcomes. Finally, the moderator undertook an evaluation of the process, which was also made public (Hammerbacher 2003).

[301] Although rather extensive minutes were produced it did not seem feasible to trace the communicative dynamics of the procedure through the available material. The interviews undertaken focused more on procedural than substantial aspects as well as the social, political and scientific context of the procedure.

[302] Here I take a structural approach and leave the personal convictions and aspirations of the minister aside, as these were not available to the investigation.

verses' the problem for the political system compared to – in particular – the British case: The challenge seen from the perspective of the initiating section of the political system was not a clear-cut case of promoting a technology despite public opposition and hesitation. Rather, the Government had to balance its own different objectives (promotion vs. precaution/public acceptance) and externally to respond to international developments as well as pressure from domestic scientific and business interests. It was in this particular situation that DGG was shaped, as I shall try to bring out in the following.

The Preparatory Phase

First I shall take a closer look at the purposes of the procedure as presented by Renate Künast, the responsible minister, at the initiation of the process, which I will take to be an indication of the political system's expectations of the process (or at least of how it would like the participants and the public to see its motives).

The task is, in Künast's formulation, particularly challenging...

> *"... weil die grosse Mehrheit der deutschen Bevölkerung gentechnisch veränderte Organismen im Lebensmittelbereich ablehnt und sich gleichzeitig wirtschaftliche Interessen unabhängig von diesem grundsätzlichen Unbehagen sehr weit entwickelt haben. Wir müssen also aufpassen, dass der Graben zwischen diese Interessen nicht immer weiter wird, immer größeren Teilen der Lebensmittelproduktion der Boden des Verbrauchervertrauens entzogen wird"* (Künast 2001: 2)

The central problem to be addressed was hence one of social integration, namely to ensure that the interests and expectations of different parts of society did not differ so greatly as to endanger the maintenance of trust in the food markets. As such, the controversy over the application of biotechnology is seen as holding the potential to spread to other parts of the food chain, which had hitherto largely maintained consumer confidence.[303] The political system sees it as its task to facilitate such social integration. For that purpose it needs to gather knowledge of its potential feasible scope of action (i.e. how it can intervene without provoking further disturbance):

> *"Es geht darum, verschiedene Interessenslagen herauszuarbeiten und einen Kommunikationsprozess zwischen den verschiedenen Seiten so weit nach vorne zu bringen, dass wir staatliche Handlungsoptionen benennen können. Handlungsoptionen, die dann möglichst auch in der Mehrheit der Gesellschaft auf vertrauensvollen Boden bauen können."* (ibid: 3)

Implicit in this quote is the assumption that the different 'sides' in the procedure are in fact representative of sufficiently large sections of the society that they in aggregation (if not collaboration) can outline the conditions under which confidence can be (re)established and maintained.

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[303] Perhaps this indicates the experience learned by the political system from BSE, that issues which in terms of the physical risks involved are substantially unrelated, are easily intermingled in communication in the public sphere.

However, the different societal actors do not necessarily share the objective of the political system to promote social integration (at least in the form suggested). Therefore, their willingness to participate could not be taken as given, it had to be ensured through promises of substantive as well as procedural influence.

The longstanding opponents of genetic engineering had little motivation to join a consensus-seeking procedure, as they basically depended upon their ability to mobilise a certain protest potential (and had had certain negative experiences with such procedures in the past). At the time surveys indicated widespread public hesitation towards accepting gene technology in the agri-food domain. Hence, publicly these organisations stood to gain little in relation to their constituencies from participating (Hammerbacher 2003: 6). However, in a corporatist political culture they would also stand to lose political credibility (and eventually influence) by not participating, especially since the responsible minister was presumed to be sympathetic to their viewpoints.

The representatives from industry and the mainstream scientific community considered the suggested procedure as a step back from the earlier initiative of the Chancellor's Office.[304] Nonetheless, the industry organisations in particular had an interest in exhibiting the will to dialogue, and the representatives from plant breeding and biotechnology had an interest in getting into closer contact with the food processing industry and food retailers.

None of the invited organisations declined the invitation from the BMVEL[305] although the expectations that the discourse would alter something substantially were – at least among the longstanding participants in the biotechnology debate – rather limited. Hence, at the outset both expectations and engagement were limited.

In her speech the Minister outlined some goals for the process, which she claimed should be open-ended in terms of results (*ergebnisoffen*) but still structured (Künast 2001: 9). For that purpose she set four expectations, namely that the procedure should:

- build on an extensive analysis of factual knowledge (*Sachstandsanalyse*)
- be guided by a competent management of the discursive procedure
- ensure the participants information about green gene technology and alternatives, in order to achieve an improved mutual understanding

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[304] From the perspective of Verband Deutsche Pflanzenzüchter the procedure was seen primarily as an attempt from a green minister to stall any further steps towards the introduction of gene technology in Germany: "In Wirklichkeit wollte das Ministerium, dass da nichts heraus kam, das war deutlich" (Interview with Gispert Kley, 26.04.2004).

[305] Although some shifted the involvement to lower levels in their internal hierarchies (Interview Hammerbacher, Lückemeyer)

- ensure stronger public participation, especially consumers, at the assessment of the application of green gene technology (ibid).

Formulated in this way, the goals of the procedure could hardly been seen as controversial. However, the minister also mentioned some more 'personal' expectations, which to the advocates of the technology were seen as indication of an overtly critical stance. For instance, when she claimed that societal benefits should be at the centre of the debate:

> *"Von zentraler Bedeutung ist für mich die Bewertung des Nutzens der Grünen Gentechnik und die Kontrollierbarkeit der technischen Entwicklung. Der Diskurs sollte sich aus unsere Sicht daher mit den Fragen nach dem* gesellschaftlichen Nutzen *der Grünen Gentechnik, deren Risikopotential und den Voraussetzungen für eine verantwortbare Nutzung befassen."* (ibid: 9-10, emphasis added)[306]

Where earlier technology assessments had focused more clearly on evaluating only the risks of biotechnology, this broader focus on alternatives and *societal* benefits was perceived with some dismay by the industry representatives, who saw this as an inappropriate intervention in their innovative freedom and the principles of a market based economy.

Although the BMVEL left the specific thematic agenda setting to the participants, two framing conditions were established from the outset: that the consumers should be protected:

"*Die Verbraucherinnen und Verbraucher müssen geschützt werden. Und das heißt für uns, die staatliche Seite, dass wir ihnen die Wahlfreiheit zwischen Lebensmitteln mit und ohne GVO sichern müssen*" (ibid: 3). And that suggested solutions had to conform to international regulation and be viable under the conditions of a still more globalised agricultural world market.[307]

As the quote above indicates, the German political system, under the auspices of a green minister for consumer protection, chose a rather wide interpretation of consumer protection entailing not only the protection against physical risks, but also access for consumers to GMO free produce. Thereby an argumentative burden was to some extent put on the advocates of GM crops to demonstrate not only that their products did not entail (unacceptable) risks for consumers or the environment, but also that it would not impede conventional and organic farming. Furthermore, the protagonists were 'forced' in advance to prove that GM technology would also be socially benefical. Although the ministry stressed

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[306] Here the distinction to the attitude of the British government is particular poignant. The British government tried to tone down these more programmatic aspects and questions about the '*societal*' benefits of the technology and focused solely on physical risks.

[307] However, where 'globalisation' is often invoked to justify a somewhat fatalistic attitude in regard to regulation, the German minister for consumer protection stressed that there was substantial international interest in how Germany chose to deal with these issues, and that she thought that Germany should not accept, as suggested by the USA, that labelling and a precautionary approach to risk assessment amounted to 'discrimination' against certain products or technologies.

that the debate was to be 'open ended' and controlled by the participants, this 'preframing' from the political system markedly conditioned the thematic structure of the process.

After control of the process was handed over to the steering committee (still under a BMVEL chairing), five goals were agreed upon by the participating organisations.

- Clarification of matters in relation to green gene technology;
- Formulation of different perspectives on the development of green gene technology with participation of the affected groups;
- Information for the public, especially consumers about the process and substance of the discursive procedure;
- Structuring of the debate and development of new impulses for the public debate on green gene technology;
- Consideration (*Erarbeitung*) of scope of action (*Handlungsoptionen*) and recommendations.

These goal formulations were clearly compromises formulated on an abstract level, and can be seen as an indication that no agreement existed as to how the topic ought to be approached or what outcomes could be expected. The last point was initially formulated as targeted specifically at the political system. However, parts of the Government were anxious that recommendations could end up having too binding a character for the political system.[308] Hence, a formulation less directed to policy advice had to be found (Hammerbacher 2003: 12). A compromise was formulated, which spoke of providing recommendations without a specific 'address'. As such, the process can be seen as one where the political system attempted to initiate a dynamic in its environment to search for viable corridors of intervention, but without committing itself to outputs in a way that could delimit its future scope of action.[309]

It was characteristic that not only the substantive negotiations during the discursive procedure were controversial. Some principled issues needed to be confronted even before the debate took off, and had to be settled by negotiation and compromise rather than the argumentative mode of communication envisioned for the discursive procedure itself.[310] Two issues were particularly controversial: the selection of specific topics to be dealt with, and the selection of experts to be invited.

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[308] There were certain disagreements between BMVEL and BMFT (ministry for research and technology), which under Social Democratic leadership had a more positive attitude to the promotion of agricultural biotechnology and was concerned that the discourse would be used by GM sceptics as a platform to 'legitimise' demands, which would tie the hands of policy makers.

[309] Here it can be argued that although the substantial aims differed, the manner in which the political system handled the 'discursive risks' from such procedures was similar to that of the British government.

[310] As a representative of the BMVEL explained, it was in the steering committee that the main struggles were fought (Interview, Lückemeyer).

The agenda-setting process was difficult because fundamentally different perspectives existed among the participating groups on what 'the issues' about genetic engineering really were.[311] As such, it was not possible to establish the programme according to a 'logically coherent' structure (ibid 2003: 19-20).[312] In the end it became the task of the moderator to bundle issues together in a preliminary agenda, which was then negotiated and finally agreed in the steering committee. Hence, the programme for the procedure was formulated as a compromise between the organisations most active in the steering committee according to what 'headings' they believed served their interests.

The five thematic blocks had the following headlines:

- Maintenance of biodiversity
- Potential for innovation and future scenarios of green gene technology
- Benefits and risks for consumers and producers
- Preconditions, chances and consequences of the renunciation of green gene technology
- Information, public participation and freedom of choice[313]

The Discourse Phase

Once the agenda had been settled the actual discursive part of the procedure involving representatives of all the participating organisations was initiated – on a tight schedule. It is well known among TA practitioners that discursive procedures often take longer than expected. This procedure lasted nine moths, but the actual discursive interaction was compressed into just under three months and was allegedly under significant time pressure. The schedule was decided by the political system, as the procedure was placed temporally in the last year of the electoral period. This motivated the green minister to attempt some movement in the policy arena on a topic paralysed due to the combined effects of BSE and the EU moratorium in order to show some political results before the oncoming election. Secondly, the electoral prospects were uncertain, and it was clear that the process had to be completed before the election, as it was uncertain that it would be carried through if a gov-

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311 In distinction to the WZB procedure, here a (mainstream) scientific framing was not allowed to dominate the communication.

312 According to the moderator a majority of the agreed theme-blocks were aligned with 'conceptual preferences' of the GM sceptic environmental and consumer organisations than with industry's interests, i.e. more oriented to considering potential problems from a large scale implementation of GM crops. However, the industry side 'got' a thematic block about the potential for innovation and had a significant interest simply in demonstrating a willingness to participate in the dialogue (Hammerbacher 2003: 19-20).

313 In addition to this, the steering committee also agreed on a number of procedural rules for the process, including rules concerning press contact in order to avoid that mass medias would be used strategically during the course of the procedure.

ernment without participation of the Greens were elected. As a consequence the procedure could not be delayed or postponed.

Temporally, the procedure also coincided with a scandal in the organic food sector, with a consequence that representatives of the organic framing organisations could not devote any attention to the discursive procedure for some of the central sessions. According to the moderator, the combined effect of these two temporal conditions was that the full potential for mediation was not reached.[314]

Part of fulfilling the requirement that the DGG should be based on 'extensive factual knowledge' was the consultation of experts on the issues to be debated. In principle, the inclusion of 'external' expertise meant that the substantive content of the discourse would be difficult for the participants to foresee and control. As significant strategic interests were involved, this uncertainty was difficult for some of the participating organisations to accept. As a consequence the selection of experts to be invited proved to be a rather controversial aspect of the planning process. In a discursive procedure where there is no third party acting as arbiter, all decisions must be carried through by consensus, or at least accepted, by all participants. In this case, 'science' was not perceived as a neutral resource and procedural mechanisms had to be devised for the selection of experts. This was impeded by the different assessments of the existing knowledge base and quality of research. As in the other cases the actors were divided along cultural bias-lines in their confidence in scientific knowledge and scientific organisations. On the one hand were the GM proponents from mainstream science and industry, who in the words of the moderator: "... *aufgrund der aus ihrer Sicht langjährige abgesicherten Forschungs- und Abwendungs-Ergebnisse grundlegende Kritik an der Technologie und ihrer Sicherheit faktisch nicht mehr akzeptierte.*" (ibid: 17). This represented a 'mainstream' scientific perspective, which exhibits a preference for verified knowledge and tends in most cases to consider uncertainties as manageable by cognitive means. On the other hand were those whose focus lay on the uncertainty and predictive difficulties as well as the wider socio-cultural implications of the technology, and clearly favoured a less reductionist approach to scientific issues with more room for doubts and uncertainties. The GM sceptics demanded that all expert positions were filled according to a pro/contra proportional principle in order to create a platform for the articulation of 'counter-expertise' on all significant issues. In order for the procedure to be continued, the GM proponents accepted this demand. In effect, the problem of 'discursive risks' arising from of incongruent cogni-

[314] This was so because the organic farmers, unlike to the environmental organisations on the sceptical side had a more material interest in reaching an 'understanding' on the conditions for co-existence and hence had a less fundamentalist attitude. However, as the organic farmers were prevented from devoting their full attention to the process, the less compromising line of the environmentalists prevailed among the GM sceptics (Interview, Hammerbacher).

tive framings (and in reality also normative evaluations) was shifted to the social dimension, where it was settled on a simple numerical basis, i.e. an equal number of experts.

This opting for 'proportional' expert representation had a number of consequences. Firstly, it led to a process where it was the organisations with clearly articulated positions were able to select or 'appoint' the experts, in effect 'their' experts,[315] which meant that the polarisation of the participating organisations was 'reproduced' among the invited experts. Secondly, it had the effect that experts holding no reputation with either of the polarised actors had hardly any trenchancy in the confrontations, nor did the organisations with less polarised positions on GM issues have much influence on the selection of expertise.[316] Formulated more abstractly this can be seen as a sign that the assumption (or ideal) of 'science' – understood as a set of theories, methods and social mechanisms for arriving at shared cognitive evaluations – can function as a neutral, uncontested reference point for all in social conflicts was abandoned from the outset.[317] One implication of this was that the process was no discursive procedure among experts. The invited experts gave presentations and in some cases exchanged viewpoints with each other and the participants, but they were not expected or encouraged to reach agreements. The experts were used as strategic, argumentative resources by the participating organisations.[318]

In the substantive dimension, the procedure was marked by the fact that although all participants were interested in a comprehensive procurement of information and knowledge, the use of expertise and scientific knowledge was framed differently by the participants, depending on whether they were in favour of or sceptical towards GMOs, which also influenced what the different participants expected the aims of the process to be.

For the advocates of GMOs the main aim was the acknowledgement of what they perceived to be matters of fact established by scientific research as well as what they saw as the inevitability of the introduction of GMOs also into the German food chain, which required an internationally competitive regulatory framework. The organisations more oriented towards precaution and the limitation of biotechnology were interested in breaking what they perceived to be the reductionistic hegemony of mainstream science (tinged with strong economic interests in the introduction of GMOs) and point to uncertainties, ambivalences and shortcomings in the established knowledge, and to create the acceptance of a plurality

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[315] This meant that primarily scientists with known preferences on the respective topics were invited.

[316] Interview, Hammerbacher

[317] This was exactly the role 'science' was perceived to play in the WZB procedure.

[318] In this respect the procedure appears as markedly less 'policed' in the cognitive dimension by the moderator than, for instance, the WZB herbicide project. Perhaps this is one of the reasons the procedure did not break down as the WZB discourse did.

of theoretical and practical approaches, which could also help to ensure viable alternatives to GM agriculture.

As such, both proponents and sceptics made reference to science, but with different focuses on and interpretations of what constitutes reliable fact and relevant uncertainty. Therefore, the same information held different relevance for the different actors and a thorough rationalisation of the controversial topics on the more operational level was not achieved. This was visible in aspects of how the topics of the procedure were structured, as well as on more technical issues such as the acceptable level of contamination of non-GM crops with GM material.

The promoters of GM technology considered the fundamental question of 'whether' GM agriculture should be accepted in German agriculture and food production as settled beyond dispute and only wanted to discuss 'how' issues, i.e. what regulatory frameworks needed to be put in place and according to which principles these should work. The sceptics on the other hand refused to 'yield to the normative force of the current state of affairs' (Moldenhauer 2003: 250) and insisted that an exit option should be ensured. Given this state of affairs all participants I interviewed about the process expressed the opinion that next to no effect from the expert presentation 'across the fronts' was discernable. Hence, little mutual *cognitive* learning was occurring in the eyes of the participants.[319]

Despite these differences among some of the most prominent participants (i.e. longstanding actors in the biotechnological arena in Germany) some 'consensual' results were reached and as such the BMVEL registered what it considered as a significant willingness among the participants to engage constructively with the issues,[320] although it was also noted that the 'fronts' were hardened to a degree that made it very difficult to motivate any significant movement.[321] The achieved points of agreement were located on a very abstract level, which did not immediately invite any consensual political or regulatory operationalisations. They served rather as 'argumentative chocks' that allowed the process to break off interminable disputes by elevating them to a more abstract level.

Among the consensual formulations was that the protection of biodiversity should be a goal and a criterion for risk assessments of GM crops. It came as some surprise to the GM sceptics that industry representatives readily agreed to this. However, given the agreement that no reliable measurements or conceptual consensus existed for evaluating effects on biodiversity, this was interpreted as a symbolic gesture. It was also agreed that the freedom of choice for producers and consumers should be ensured, allowing them to consume both GM and non-GM products (co-existence in agriculture between GM, conventional and

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[319] Furthermore, the BMVEL did not think that any facts new to the ministry emerged during the process (Interview, Lückemeyer)

[320] Interview, Wollersheim

[321] Interview, Lückemeyer

organic crops). Furthermore, the participants agreed that reliable consumer protection was necessary, and that this can only be achieved through viable international regulatory frameworks. However, the participants disagreed over how these rather abstract principles should to be operationalised (Ergebnissbericht 2002).

The fact that the consensual points were located at a relatively abstract level meant that the discursive procedure did not deliver any direct conflict mediation: "*Ein unmittelbarer Beitrag der im Ergebnisbericht des Diskurses festgehaltenen Arbeitsergebnisse zur Konfliktregelung und Problemlösung lässt sich aufgrund des Abstraktionsgrades der formulierten Konsense und konsensualen Dissense nicht aufzeigen.*" (Hammerbacher 2003: 36). Nonetheless, the procedure was observed to have brought some movement of 'the fronts' over the longstanding controversy: "*So dokumentieren aber eine Reihe von Verschiebungen in den Schlüsselthemen der Gentechnikdebatte gegenüber früheren Diskussionsergebnissen zwischen den gesellschaftlichen Akteuren und haben insofern für die anstehenden rechtlichen Regulierung in Deutschland und der EU politischen Spielraum aufgezeigt.*" (ibid). However, as the moderator continues:

> *"Die Identifizierung neuer politischer Schlüsselthemen wie Wahlfreiheit und Koexistenz stellt allerdings noch keine Lösung der mit der Grünen Gentechnik verbundenen Interessen- und Wertkonflikte dar. Es entwickelt sich vielmehr innerhalb der Metathemen eine neue Themenlandschaft. Angesprochen werden darin die konkreten Regulierungsaufgaben zur praktischen Gewährleistung von Wahlfreiheit und Koexistenz."* (ibid: 37)

In other words, the controversy as a conglomeration of communicative events evolved and took on new themes (leaving others behind, whether settled or not). This, however, did not mean that the controversy was solved or settled, nor that the basic divisive configuration of actors had been significantly modified.

That the issues the participants considered the most important in the controversy were not settled became particularly evident in the closing session where the outcomes produced were presented to the public and the responsible minister. The steering committee had formulated a consensual report about the discursive procedure, which basically documented that agreement could only be reached on some very general points, whereas their interpretation and operationalisation remained controversial.[322] Only a 'minimal consensus' had been reached, mostly consisting in the agreement to disagree and the request that the political system took decisions in a manner that would deescalate the controversies (Ergebnissbericht 2002: 31).

In addition to this, however, the participating organisations were given the opportunity to present their individual evaluations of the process. The fact that the procedure had taken

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[322] One steering committee memb er described the consensual points as: "Gemeinplätze, Aussagen die zu nichts verpflichtet" (Interview, Kley)

place was mostly praised, while its outputs received a more mixed assessment.[323] Actors who had had a longstanding involvement with the debate about agricultural applications of biotechnology tended to consider the procedure a failure and took the opportunity to lay the blame for this and formulate or reiterate demands to the political system. In doing so they primarily framed the process as an example of the unwillingness or inability of their opponents to learn, and their neglect of the interest of the public.

Effects of *Diskurs Grüne Gentechnik*

In her speech addressing the participants in the closing session Künast acknowledged that major disagreements persisted, but nonetheless declared the discursive procedure a success. In part simply because the procedure had 'held together' and the various knowledges and viewpoints had been explored 'cooperatively'. But more significantly because the political goals of the Government had more or less found support in the consensual points agreed among the participants, namely that consumer protection, freedom of choice, labelling and traceability, and the coexistence of conventional, organic and GM agriculture should be ensured.[324] The fact that these were principled agreements, about whose interpretation and operationalisation significant controversy and disagreement persisted, was not mentioned in the speech.[325]

It is hardly surprising that a minister in an ongoing electoral campaign is inclined to declare a procedure initiated by her ministry a success. However, as mentioned the participants were less inclined to share this assessment. This included a representative of the BMVEL, who in retrospect expressed doubt about whether the process had been worth the effort and expenditure.[326] When asked about the effects of the discourse, representatives of both sides claim that little was achieved across the divide between the two camps. However, it is mentioned as a positive effect that cooperation between the organisations on the respective

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[323] This was considered by the BMVEL as a worthwhile result as well, as it had allegedly contributed a different tone to the debate. A certain discursive tact had been developed in the process, and most participants mentioned that the procedure had provided a valuable platform for the provision of factual knowledge and information, but also for some actors an option to get to know the viewpoints and concerns of the other better.

[324] As an external observer it may be worth considering whether this outcome was an effect of political signals given prior to the procedures – i.e. that the participating organisations responded strategically to their observations of the expectations of the political system – rather than an expression of a 'genuine' (whatever that would mean exactly) will to make concessions on the topics explored. However, an assessment of such causalities was not possible on the basis of the compiled material.

[325] Instead the minister, to the dismay of the GMO positive organisations, reiterated a number of programmatic points made both before and during the discursive procedure by the sceptics about the search for alternatives, that the nutritional policy should be about wholesome diets, that a sustainable agriculture should be the *Leitmotiv* when new technologies were assessed in both ecologic, economic and social dimensions (Künast 2002).

[326] Interview, Lückemeyer

sides was strengthened. On the side of the GM promoters and the initially more neutral organisations representing food processing and retailers a collaboration was initiated on how to deal with practical issues concerning labelling, traceability and information for the public, allegedly on the background of a growing perception among the food industry and retailers that sooner or later they would have to deal with GM ingredients.[327] On the side of the sceptics a collaboration and coordination effort was initiated between the environmental, consumer and organic farming organisations, which had thus far worked separately in this area.[328]

To some extent it thus seems that the procedure managed to integrate the efforts of the respective sides, but not to mediate 'across' the controversy. The aim here is not an evaluation of the procedure, but it seems worth noticing that these observations hardly – or at least only partially – correspond with the initial aim of the political system, namely to ensure a certain degree of social integration *across* the divisive viewpoints.[329]

One representative of the pro side believed that the political climate under the Red/Green Government had been and continued to be unfavourable for agricultural biotechnology, and that it would take at least ten years before Germany produced GM crops and products on a significant scale. This, however, was not ascribed (only) to the DGG but also to a biased minister strongly influenced by environmental organisations, who were seen to successfully continue to formulate new barriers for commercialisation.[330] This assessment was 'shared' by the environmental movements, who saw their fight as relatively successful as time had been won in which the struggle for stricter regulatory means could be continued and support of GM-free agriculture could be strengthened.[331]

Concerning impacts in the public sphere, the immediate effects of the DGG were quite modest. The moderator assessed that about 100 reports from the events appeared in the printed and electronic media. This was allegedly considered satisfactory for an event like DGG, which did not match the selection criteria of the mass (no *news*, attempts at overcoming differences rather than attenuating them, no spectacular images). A representative of the BMVEL expressed some disappointment at the low media effects and lack of resonance achieved in the public sphere, but not substantial surprise.[332] The publicity strategy for the procedure was aimed at ensuring transparency not at large media impact. During

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[327] Interview, Kley

[328] Interview, Röscheisen

[329] Unless one of course takes the willingness to remain attached to the communicative process alone – despite meagre substantive results – as a sign of successful social integration.

[330] Interview, Kley

[331] Interview, Röscheisen, assessment also expressed by the moderator (Interview, Hammerbacher)

[332] Interview, Lückemeyer

the process itself this was partly the result of the demand of the participants that all press related activities went through the steering committee, as a means of safeguarding the procedure against attempts to use public relations strategically during the procedure.

On this basis it must be concluded that the DGG had some effect on political communication and some in the organisational landscape, but little in the wider public sphere. The procedure had certain catalysing effects among the participants 'within' each camp. However, these can hardly be considered as mediating or de-polarising in respect of fundamentally opposed evaluation of the technology.

As most of the regulatory framework for GMOs (deliberate release guidelines, principles for safety assessment, labelling and traceability) is shaped at the EU level (along with approval procedures), the scope for the German political system to shape its own policies in the domain are tightly circumscribed. But, of course it, should not be overlooked that Germany is a major player in the EU, who can influence its policies significantly. In the negotiations about the revision and drafting of the directives meant to facilitate an end to the moratorium, the Red-Green government had pursued a rather restrictive course compared to other member states prior to the DGG procedure. Subsequent to the procedure the Government was re-elected and the major thematic principles emerging from the procedure (protection of biodiversity, co-existence and consumer choice (labelling)) were included in the coalition agreement as the policies to be pursued in regard to agricultural biotechnology. The BMVEL remained under Künast and a very strict line – leaning towards the perspectives of the GM sceptics in the procedure – was followed both in the EU negotiations and domestically.

After the passing of the revised and new EU directives on deliberate release, food and feed and labelling and traceability, a revision of GenTG in order to implement the directives was initiated. In this process too the BMVEL pursued a very restrictive policy, in particular on the issues of co-existence and liability rules, which remained within the regulatory competence of the member states. At the time of writing (December 2004) it seems that the Government – to the outspoken dismay of German GM protagonists – will pass a regulatory regime on co-existence and liability in the case of cross-fertilisation, which will be among the strictest in Europe and are considered by some observers to spell a *de facto* halt to GM commercialisation in Germany.[333]

In the legislative process – which involved complicated negotiations and powerplay between the federal and the *Länder*-level, as well as extensive consultations of a more conven-

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[333] For instance *Deutsche Bauerverband*, which on the passing of the revised GenTG commented that "... mit dem Gesetz die Vorgabe Brüssels, eine Koexistenz zu ermöglichen, regelrecht konterkariert wird", and that the law had the character of '*Gentechnikverhinderungsgesetz*' (quoted from www.biosicherheit.de/aktuell/313.doku.html, 16.12.2004)

tional character that cannot be recounted here – the discursive framings articulated in the DGG played a visible role. The points of 'agreement' provided the guiding policy goals for the Government. However, there can be little doubt that in drafting specific regulatory acts the 'consensual' policy goals were interpreted in a manner, which did not find broad support among the participants in the procedure. Hence, as the Government was so to speak selectively reading the output, it seems difficult to assess counterfactually to what extent a different policy would have been pursued had the procedure not taken place.

Diskurs Grüner Gentechnik Analysed

In analytical respects the DGG procedure retraced in this chapter both shares certain features with the other cases and distinguishes itself in a number of ways. Like the other cases, it can be seen as a specifically differentiated system of communication with the aim of mitigating social controversy over a particular technology via modes of communication, which the initiators understand as participatory and deliberative. In doing so, the procedure drew upon some of the discursive frames and semantic figures, which have been developed as a response to such controversies in a number of areas. However, the DGG procedure constituted a particular operationalisation of this semantic, as its location in a context of predominantly corporatist policy setting resulted in a specific social and thematic configuration of the process. In the remainder of this chapter I shall analyse aspects of the procedure in order to bring out more clearly these particularities and render the procedure comparable to the other cases.

If one considers the DGG procedure as a relatively well-defined, temporary communicative system, two initial observations can be made. It was initiated by the German political system and remained significantly conditioned by this, socially, temporally and substantively. However, the procedure as a communicative system did also develop a certain autonomy and *Eigenlogik*, which clearly differentiated within the political system, so that the Government and the procedure as a temporary organisation (consisting of yet more organisations) observed each other closely as relevant environments. The BMVEL initiated the process, but once the procedure was under way, the ministry chose a deliberate 'hands off' strategy in order to explore whether the participating organisations could settle (any of) their cognitive and normative differences themselves prior to a new political programming of the domain.[334] The task in the following section will then be to analyse how this combination of a clear 'directedness' of the process towards politics, and the attempt to confront

[334] The participating organisations were of course aware of this attention from the political system and were perhaps communicating as much to the political system as to other participating organisations. However, they were obliged to do this exactly by taking part in the procedure.

a number of organisational interests in debates at the intersection of a number of functional subsystemic perspectives gave the procedure its specific character.

From the theoretical perspective of this thesis one of the central features of the observed procedures is the attempt to mitigate risk controversies by reconfiguring the interface between decision makers and those affected by means of inclusionary mechanisms, which can proceduralise conflicts resonating in the wider public sphere. In this respect perhaps the most noticeable feature in the *social dimension* of the DGG procedure is the location of the principle of inclusion at the *organisational level.* The political system met with difficulties in formulating a policy that would find broad support, and it acknowledged that it would be counterproductive to push through a solution against the wishes of most organisations. In systems theoretical terms; such a solution would be likely to create more complexity rather than less. The political perplexity and need for consultation, combined with the fact that the minister was from a party with an ideological preference for participatory forms of politics,[335] led to an approach which on the one hand can be characterised as 'all-inclusive' (the selection criteria was to get 'everyone' on board), but on the other hand was marked by 'virtual' representation of 'the public', understood as ordinary people affected by future policies. An organisationally manageable and non-plebescitarian operationalisation had to be found.

In this case no lay participation was envisioned or wanted. 'The public' was more or less unproblematically considered to be adequately represented through the participating organisations. The responsible director in the BMVEL explained that the larger population was represented:

> *"...in dem wir Vertretern der Bevölkerung in Form von 30 verschiedenen Gruppen eingeladen und in diesem Prozess eingebunden haben. Das haben wir ganz offen gemacht und darüber informiert. Es hat also nicht hinter verschlossenen Türen stattgefunden...Die Verbände waren viele und unterschiedliche und wir sind davon ausgegangen, dass wir eine Grossteil der Bevölkerung zumindest dadurch repräsentiert bekommen haben ... 30 sind schon eine ganze Menge, eine repräsentative Querschnitt."*[336]

The participating organisations were selected pragmatically according to the questions 'who has stated an opinion, who has an interest, who is affected?'[337]

> *"Dann haben wir versucht vor allem die beiden Hauptlager einigermaßen gleichgewichtig zu besetzen, weil wir wussten ja wenn das nicht passiert, dann gibt es von Anfang an Ärger – dann wird man nicht über Gentechnik diskutieren, sondern nur über Prozedere."*[338,339]

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[335] "Wir wollen bei allen Probleme von gesamtgesellschaftlicher Bedeutung immer alle Beteiligten Akteurer og Akteurinnen an einem Tisch holen." (Künast 2001: 3)

[336] Interview Wollersheim

[337] Interview, Lückemeyer

[338] Interview, Lückemeyer

The considerations on the selection of participants indicate that the political system took it for granted that a 'representative' cross-section of the existing organisational landscape mirrored the (legitimate) concerns of 'the public', and thus if 'both sides' were equally strongly represented, the proceedings would be considered fair.[340] This would be shared by the wider public, which was ascribed the role of audience of a transparent procedure.

In short, being an organisation with some kind of constituency and a publicly stated attitude towards GMOs, or an (assumed) stake in their development, meant being qualified for participation. In regard to the issue of representativity, the principle opted for in the DGG must therefore be characterised as *sectorial* rather than demographic. Once invited, no distinction was made between the types of invited organisations in the procedure, for instance whether they were special interest groups representing the biotechnological industry or public interest groups claiming to speak on behalf of 'the environment' (or more precisely certain sections of the population's concerns about the environment) or on behalf of 'consumers'. All had – at least in principle – to obey the same procedural rules and state their case argumentatively. Furthermore, the sectorial principle was complemented with a quantitative concept of fairness, whereby 'the positions' (pro/contra) were to be 'represented' with equal strength, apparently independently of the distribution of pro/contra opinions in the wider population. Arguably, this may have contributed to a situation where the controversy was in some respects reified rather than mitigated in the procedural design, but was considered a sine qua none for the procedure to get under way at all.

The fact that the organisational aspects of the procedure by their very nature had polarising rather than mitigating effects, was further attenuated by the use of expertise. The clear role differentiation between 'experts' and representatives of the participating organisations was another built-in organisational feature of the procedure. Yet, this was no simple functional differentiation – i.e. the safeguarding of cognitive competence through the involvement of 'science' and scientists – but a 'strategic differentiation', where scientists were used as strategic resources in addition to (or perhaps rather than) neutral arbiters clarifying matters of fact for the participants.

The choice to consider public concerns as adequately represented by the existing organisational landscape appears to be a well-established feature of the German political culture. However, I interpret the fact that lay inclusion was considered but abandoned as an indication of the political system's belief that difficulties in establishing widely acceptable regula-

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[339] Perhaps characteristic of the German corporatist political traditions, trade unions and the two churches were invited to participate in an almost automatic fashion, as 'jobs' and 'ethics' was on the agenda.

[340] This assumption was apparently shared among the representatives of the participating organisations with whom I spoke, as well as the moderator. They all expressed that the composition of participants was reasonable and representative of the controversy, which indicates how ingrained the thinking in terms of, on the one hand, existing controversy and opposed interests and, on the other, the practise of settling societal controversy through organisations is in German political culture..

tory principles *originated* with these organisations rather than these simply mirroring 'the public'. Therefore, the solution was to establish an arena where the organisations could have it out rather than to seek an 'expansion' of the locus of the controversy by involving yet more (unorganised) participants. Implicitly, it indicates an assumption that if the established organisations can be brought to compromise, their respective constituencies will likewise accept the outcomes, whereas lay participation may simply complicate matters further.[341]

Temporally the procedure was located at a time when the Government felt that a deadlock in policy formation had to be broken, primarily due to international developments and despite a domesic desire to avoid too much attention to food safety issues. This was also tied to the end of the electoral cycle, which provided the process with a definite endpoint. In this respect the temporal logic of the procedure was determined by factors external to the discursive interactions. Although the genuine openmindedness of the Government with regard to the policies to be established was contested by several of the participating organisations, the procedure was fashioned as a consultative procedure preceding actual formulation of revised and expanded regulatory measures. The discursive process proceeded on the assumption that the political system was still undecided at least about the details of future regulatory principles. This had the effect that the discussions unfolded, to some extent, in an 'unsynchronised' manner, i.e. on different temporal assumptions about how a 'before/after' distinction could be adequately applied. The GM proponents took it for granted that it was only a matter of (a relatively short) time before GM crops and products would arrive in Germany on some scale independently of what the GM sceptics thought of it. Hence, the fundamental question of whether they should be allowed or not was framed as a past debate, an issue which was no longer at the discretion of the political system. Therefore, their intention was to discuss the terms on which this large(r) scale introduction should take place. The sceptics, on the other hand, were not willing to consider this as a foregone conclusion, insisting that the case in favour of GMOs had not been made convincingly. They argued for a wait-and-see, precautionary regulatory approach, leaving open the question of whether GMOs should be tolerated at all. In this respect temporal issues became a central bone of contention in the procedure,[342] and no agreement could be reached on what the appropriate temporal perspective ought to be.

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[341] This contrasts rather sharply with the Danish and British cases where 'the public', in their different ways, was framed as and appealed to as a moderating force, which could potentially mitigate the disputes between the organised interests and bring alternative rationalities in play.

[342] Although the differences of opinion obviously were not only temporal but substantive, it was in the temporal dimension that attempts by the moderator to make the participants agree on more concrete recommendations failed. Participants agreed that coexistence would require clear rules and regulations. The attempt to agree on an exact formulation stalled on whether this regulation should *accompany* or *precede* a decision to allow the commercial application of GMOs (Ergebinssbericht 2002: 28-29)

Another temporal aspect of the procedure pertains to its ability to function as a temporal marker in the dynamic of the policy arena, i.e. to function as a point in time at which certain topics were either settled or ignored and new ones taken up, as was clearly the case for the *Enquete Kommission* during the mid 1980s. In this respect the DGG appears to have performed the function of a temporal landmark as new themes were placed on the agenda as *the* pertinent themes to be dealt with.[343] As (abstract) points of agreement were reached they were presented to the political system as previously contentious points that could now be considered settled, that is as points behind which subsequent policy making should not be allowed to fall. However, all participants indicated that it was the operationalisation into practise of the agreed principles that would really constitute the controversial issues, and these were delegated for future processing in other contexts and by other means.[344] Nevertheless, this enabled the Government to communicate that some movement had been achieved, that it had been attentive to all viewpoints in the controversies and to equip itself with argumentative resources in its own operationalisations and specifications of the areas of alleged consensus.

As briefly mentioned above, the quite polarised configuration of the policy arena prior to the procedure was – despite its deliberative and argumentative intentions and self-description – by and large reproduced in the social characteristics of the procedure. This to some extent reified the controversy as a fundamental divide between two opposed camps. There were in fact a number of organisations involved in the procedure who were not strongly committed in advance to either promoting or rejecting GM agriculture. However, it seems that these organisations were less dominant in terms of influencing the course of the events. The polarising tendencies were also evident in the *substantive dimension*. The setting of the agenda of topics to be processed discursively, i.e. by means of arguments and evidence in a mode where non-discursive resources (economic strength, protest potential etc.) were to be considered illegitimate, evidently could not be clarified by discursive means. This was a clear-cut case of bargaining involving tit-for-tat strategies and threats by central actors. The fact that the actors considered essential to the credibility and value of the procedure were those representing strongly articulated viewpoints presumably further contributed to the polarization of the procedure.

In the substantive dimension the strategic use of expertise also seems to have played a significant role. Not only were the topical foci selected in a non-discursive manner, so was the

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[343] One observer – with few expectations as to the effects of the procedure – retrospectively assessed that the procedure had in fact moved the discursive landscape quite significantly (in the direction desired by Künast) (Interview, Gill)

[344] Notably, it was unanimously demanded that the political system should provide a stable environment of legal programming for the future conditions for commercial GM, conventional and organic operators (Ergebnisbericht 2002: 31).

selection of expert knowledge claims in the communicative content of the procedure. The procedure had a relatively high input of expert knowledge, but this was obtained in a manner quite distinct from the Danish and British cases. As they were used in a clearly divided expertise/counter-expertise format, expert inputs could not be used to mediate in the controversies between the participants. Rather, 'facts' were used to communicate dissent, not to search for agreement.

Nonetheless, it seems that because all participants were aware of the political contexts in which the procedure was taking place – namely that some kind of regulation had to be put in place –they to some degree managed to set aside more fundamental differences about whether biotechnology actually constituted a viable and desirable developmental path for German agriculture and food production in order to focus on certain more practical issues. In doing so, however, the fundamental divides were reproduced or reiterated in more technical issues, for instance questions about coexistence, liability regimes and acceptable limit values. This led to the somewhat peculiar situation that while a number of consensual points were in fact formulated and communicated, fundamental disagreement persisted nonetheless.[345] In short form this can be described as mediation through abstraction – such abstract formulations are selected that they are virtually impossible to disagree with, but they have no well-defined operational meaning or practical consequences and in effect served to postpone a determination of regulatory practise.

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[345] In the final statements, for instance, the consumer organisation Verbraucherzentrale Bundesverband warns against an insidious contamination of all foodstuffs which will eliminate consumer choice, and the environmental organisation Deutsche Naturschutzring claims that for industry freedom of choice only means the choice between more or less contaminated foodstuffs, which is not a real choice. "Wer gentechnische Kontaminationen hinter Schwellenwerten verstecken will, zeigt damit klar, dass er nicht in der Lage oder nicht Willens ist, gentechnische veränderte Verunreinigungen aus der Nahrungskette herauszuhalten".

Verband Deutscher Ölmühlen, on the other hand, claimed that "Auch die für Wahlfreiheit notwendiger Kennzeichnung funktioniert nicht ohne Schwellenwerte. Wahlfreiheit hat immer auch praktische Grenzen."

A summary of these observations is compiled in the following table:

	Risk controversy thematic:	Trust thematic:	Mediation thematic:
Social	Agenda negotiated among participating organisations. Public concerns funneled through stakeholders and fed to political system by means of sectorial representation	Willingness of Government to pay attention to all concerns articulated through inclusion of all relevant stakeholders	Clearly diverging perspectives and interests mediated though a combination of arguing and bargaining among stakeholders in equal proportion
Temporal	Procedures initiated to break political deadlock when international pressure arose Clear synchronisation with electoral cycle.	Procedures allegedly organised prior to policy commitments being formed by Government to win support of organisational landscape	Consensual points framed as 'lasting' agreements. Dissensual issues 'postponed' to be dealt with elsewhere by other means
Substantive	Inclusive agenda. Fundamental questions (*if* rather than *how*) allowed on agenda	Participating stakeholders allowed to set the agenda and decide (advise on) pertinent issues for policy-makers	Dominant cultural bias: Procedural (hierarchical) Mediation pursued through abstraction, i.e. 'principles' general enough to be compatible with the mode of observation of most actors

The Problem of Mediation

Specialised procedures devised for communicating about and possibly mitigating controversies about risky and controversial technologies are, following my argument, faced with a number of challenges before they fulfil their self-prescribed functions. As explored in the previous chapters, they need to devise mechanisms for achieving resonance for their communication in their (relevant) environments, and criteria for regulating the inclusion and exclusion of legitimate participants. A further challenge, which arguably is particularly pronounced in the German case (but certainly not absent in the other cases), has to do with what I will call the *problem of mediation* – how different modes of observation can in some way be reconciled in the procedures. If by the problem of mediation we understand the ability to facilitate social processes that produce communications, which can find support among a wide spectrum of involved participants,[346] the problem can be explored in different ways. From the perspective of the participatory and deliberative ideals underpinning most public involvement procedures, the problem of mediation is concerned with preventing procedures that are meant to be argumentative from 'degenerating' into pure bargaining

[346] Either explicitly or implicitly through the failure to raise objections.

and strategic interest maintenance (see Chapter II). The ideal is to establish conditions where collective actors are willing to 'virtualise' their usual modes of observation and their accompanying validity claims and temporarily take on the perspectives of their adversaries in order to pursue collective problem solving.[347]

Here, however, I shall opt for a less normativistic perspective on this types of challenge. In Chapter III I argued that technological controversies should be understood against the background of an understanding of modern societies as functionally differentiated, as well as how the asymmetries in modes of observations by organisations can be recounted in a parsimonious manner with inspiration from Cultural Theory. This, in my opinion, provides a fruitful starting point for analysing why such controversies appear to be so difficult to settle and why, when one topic has been abandoned either because it has been settled or simply because of a switch of focus, controversy tends to move into new fields.

Despite these theoretically convincing predictions that the reconciliation of perceptual differences regarding technological risk and desirable technological trajectories is unlikely to occur, modern societies cannot, it seems, abandon the search for viable methods of mediation. In the quest for social integration a certain level of shared references appears to be necessary (or are at least considered desirable). Hence the evolution of particular systems of communication as the procedures discussed here can be seen as attempts to find (argumentative) means to deal with controversies. The perspective outlined here can, I contend, help in pointing to some of challenges faced by such procedures which are less evident in the advocating perspectives described in Chapter II. For instance, the German case recounted in this chapter shows that such procedures may in fact risk reifying controversies when existing differences of perspective are built into the procedural design. They will not necessarily mitigate controversies simply because an 'argumentative' mode of communication has installed.

From different modes of sociological observation, the *problem of mediation* can be located at the intersection of good arguments (or evidence), bargaining power, and the cultural biases of collective actors, which presumably are all important factors for the dynamic of such procedures. In the systems theoretical approach the problem can be explored more abstractly as a matter of (collectively) selecting between and applying mutually exclusive codifications of the subsystems of a functionally differentiated society. When working from the assumption of systems theory it must be made clear that 'mediation' cannot be taken to mean de-differentiation of the communication in the functional domains. It has instead to do with the fact that on the organisational level a multiplicity of codes must be observed. However, different organisations observe in different manners, which is why 'mediation' (as a process where organisations mutually adjust to each others operations) must take

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[347] As discussed earlier this is arguably more likely to be facilitated in social situation involving the co-presence of individuals (van den Daele 2001), as is often provided for in such procedures.

place if the kind of procedures investigated here are to fulfil their tasks. For analytical purposes, I suggest the problem can be partitioned by considering how for any given issue the communication in the procedures select 1) what is or should be the appropriate code or framing in a given situation ('discursive context' of communication) and 2) how the code or frame is to be correctly applied (programmatic level of communication). This means deciding for instance whether the acceptance of applying genetic engineering in agriculture should depend (solely) on whether it entails physical risks or (also) on the various expected socio-economic effects of applying the technology.[348] Once this selection has been made, the next level emerges, with questions about what the 'adequate' level of protection against physical risk should be and how this can be established, what should count as positive or negative socio-economic effects and who or what gets to decide this.[349] Of course communication about such issues in reality proceeds in a manner significantly less ordered than this set of analytical distinctions suggests, as contributions pertaining to both levels are constantly intermingled. The present case shows quite vividly how difficult it is to align the modes of observation and selection of different collective actors – in particular when the respective perspectives are rooted in longstanding organisational commitments and the actors see one another other as 'opponents' already prior to the initiation of the procedure.

Arguably, then, a decisive element in participatory procedures is to determine and reach agreement on adequate framing(s) at the code-level as well as at the programtic level. The DGG procedures operated with a multiplicity of codes (scientific, legal, economic),[350] which allowed the controversy to span different discursive domains or modes of observation. However, it seems that the whole procedure was permeated by a meta-code of for or against (see also Chapter I) which made mediation particularly difficult as it circumvents and fuses the social mechanisms normally in place to select between code values.

In some formats 'the public' is brought in as a third-party mediator in order to 'force' the adversaries to communicate in an argumentative fashion (as seen in different ways in the Danish and British cases) when selecting codes and applying programmes. This was not the case in the DGG procedure, but arguably the political system served a similar function.

One perspective on the code level, which is often conferred a privileged status in such procedures, is scientific knowledge. Scientific expertise is deemed indispensable for managing technological risks, but is often also the discursive domain where frame clashes are most

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[348] Or stated differently whether it ought to be primarily a 'political' or an 'economic' decision, i.e. whether it should be decided with reference to 'the public' understood as citizens or consumers.

[349] More concretely in the present case the problem was in the first instance to decide whether biodiversity should be considered a value in itself and whether it should be a duty to inform consumers about the GM content of products.
Once these issues were 'agreed' upon, it was discussed how such decisions should be operationalised. In this case agreement was communicated on the first level, but the second level – where operational principles of regulation were to be formulated – remained unsettled.

[350] As did the procedures analysed in the other two cases – though in different specific configurations.

prominent and most difficult to process. It is readily accepted that organisations have different ideological preferences and contradictory economic interests – and that these may be irreconcilable. However, it is often expected – though mostly proves to be difficult – that such proceduralisations of technological controversies should at minimum clarify 'matters of fact' as a first step towards mediation.[351] This was also stated as an aim for the DGG procedures by the BMVEL. However, the procedural format selected, with its polarised use of expertise, arguably did not facilitate this aim, and it seems that confrontations among the participants regarding the scientific questions were as much about the value of different scientific approaches to settling the controversies, as they were about the specific cognitive knowledge claims (that is, making generally acceptable selections on the programmatic level).[352] In sum, significant effort was made to 'qualify' the debates through the inclusion of experts. However, as it was acknowledged from the outset that a unitary cognitive evaluation was unlikely to emerge or find broad acceptance in the communication, little actual mediation was achieved in this area.

Although the use of scientific expertise is of course only one aspect of the problem of mediation, its use is often seen as a particularly important prerequisite for mediation in such procedures. It is also one of the areas, it seems, where 'politicisation' is most difficult to deal with. I shall therefore focus in particular on this aspect in the comparative section, evaluating the different procedures with regard to how they strive to establish *competence* in different ways as a means of mediating in technological controversies.

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[351] In the German experience the perceived importance of the scientific perspective was particularly evident in the WZB procedure where scientific knowledge was pre-selected to perform the function of a privileged mode of argumentation.

[352] Therefore, the selection of expertise could proceed on a quantitative rather than a qualitative basis, as each 'side' could indeed bring representatives of their preferred scientific approach.

Chapter VIII
Comparative Perspectives

Having described the three cases separately and attempted to account for their respective contexts and dynamics, I shall now explore what insights can be gained from comparing them more systematically.

I have argued that the procedures investigated can be seen as responses to challenges arising from tensions between the normative understandings of democratically governed, modern societies – which requires 'inclusionary' legitimatory mechanisms, and their functionally differentiated structures as producing various kinds of risks – which require 'exclusionary' expertise to be managed.[353] As such, I contend, they can be seen as functionally equivalent social responses to 'similar' problems, namely a differentiation of specialised communicative contexts in which controversies grounded in diverging modes of observation of agricultural biotechnology are hopefully mitigated through participatory and deliberative mechanisms. In order to show that the procedures can in fact be seen as functionally equivalent and in order to render them comparable, I have characterised the procedures according to three dimensions derived from the theoretical discussion undertaken earlier, namely how they seek 1) to reconfigure the decision-maker/affected divide (the risk controversy thematic), 2) to ensure a willingness to delegate decision-making competences (the trust thematic) and 3) to establish social mechanisms that can facilitate mediation between the diverging perspectives present in the controversies (the mediation thematic). This characterisation has in my opinion demonstrated that the procedures can be considered sociologically comparable. Despite this common structural background, the procedures exhibit noticeable differences, which must be attributed to a host of factors, including their national contexts and more contingent circumstances, and I expect that despite numerous differences a comparison will further enhance the understanding of what is at stake in the individual cases.

However, the comparison ought also to contribute to the explanatory aim of the thesis, namely to develop a more general understanding of the background, dynamics and effects of such procedures. Hence, I shall seek to draw insights from the comparison that can help explain similarities and differences in the participatory formats observed and in the effects of the procedures.

One highly notable, overall similarity is that in none of the cases studied have the procedures been able to actually 'do away' with controversy in the sense that contentious com-

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[353] With Luhmann one could say a tension can be observed between the *social structure* – the ingrown modes of operation of a functionally differentiated society – and a democratic *semantic* – the expectation of increased inclusion – and that this induces the evolution of new ways of communicating about technology.

munication about agricultural biotechnology has ceased in the respective public spheres.[354] In order to explore why that is the case in a more detailed manner, I have argued that the procedures investigated are faced with different 'challenges' to achieving their self-prescribed aims. My interest in these challenges is grounded in the assumption that something useful can be learned from exploring not only what can be immediately observed in regard to such procedures, but also where they do not perform as expected or desired (according to their self-descriptions). The fact that the procedures investigated experienced different challenges – compiled under the headings of 'resonance', 'inclusion' and 'mediation' – is taken as an indication that because they are located in different contexts and exhibit different organisational features, challenges are concentrated at different points. Nonetheless, I intented to show in this chapter that the challenges identified as particularly pronounced in one of the three cases point to issues, which are present in all cases and arguably pose general questions for such procedures of public involvement. I do not claim that these challenges are exhaustive for the difficulties such procedures may encounter, but as they seem theoretically relevant and are observable in the empirical material I take them to express something significant about the kind of procedures investigated.

In the following I shall seek to compare the cases along dimensions derived from the challenges identified during the case studies, although they will be given slightly different labels.[355] The problem of inclusion discussed in relation to the British case will be taken up again here under the label of the 'construction of representativeness', the problem of mediation identified as particularly pronounced in the German case (where I argued that mediation seems particularly challenging in relation to the use of science), will be taken as an occasion to discuss what I call the 'construction of competence' and finally the problem of resonance introduced in relation to the Danish case will be addressed here under the label of 'links to policy making'. Arguably, these thematics represent issues that all participatory and deliberative procedures must address in one way or another when 'operationalising' the public for involvement with policy making, and I shall seek to explicate and explain how different solutions to these issues were chosen in my cases and what effects this had.[356]

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[354] More abstractly a technological controversy can be said to have ceased when broadly accepted criteria for when the technology is 'working' and when it is not working have been adapted in society – or when the involved actors simply turn their attention to something else.

[355] This re-labelling is intended to indicate that although the problematiques are introduced in the context of the respective cases where they are most pronounced, they are in fact issues that all procedures have dealt with, and arguably that all participatory procedures need to deal with.

[356] Arguably, these dimensions correspond (roughly) to the three types of challenges posed by 'radical uncertainty' in PTA procedures as identified by Pellizioni (2003a) and discussed in Chapter II. These were incommensurability, indeterminacy and complexity, which can be seen as requiring selections on (among other things) issues such as 'who should be included?', 'what knowledge is required?' and 'how are procedures made efficacious?', which is very much in line with the dimensions suggested here. As such, the results of comparison can also feed back into some of the theoretical discussions approached in earlier chapters. Similar issues are addressed in the comparative volume edited by Joss and Bellucci (2002).

A few disclaimers are perhaps required to make the aim of the comparison clear: the thesis does not operate with causal hypotheses of a propositional kind to be 'tested' ('when participation goes up, controversy goes down') proceeding instead in a more interpretive manner, as the investigation has sought to be as sensitive as possible to the details of the cases. Therefore, the explanatory mode will not lay down 'laws', but explore more cautiously what can be learned in light of the research question from the comparison of the case studies according to the theoretical considerations outlined earlier. This somewhat modest explanatory ambition is necessitated by the nature of the empirical material compiled (dense description of a few cases). Arguably, the only really overarching explanatory variable available in the material is 'national context', as organisational features of the three cases vary on so many points and are so immersed in their respective contexts, that it seems difficult to draw unambiguous causal conclusions about the relationship between the procedural formats, framings of the substantive issues addressed and the subsequent effects of the procedures.[357] Although the three contexts included exhibit noticeable differences in institutional structure and political culture, this cannot in my opinion carry the explanatory load required to account for all the differences observed. Institutional and thematic path-dependencies of a more contingent kind must also be considered, as I sought to show in the descriptive sections of the case studies.

However, variations in the national contexts of the different cases have been observed, which could justify a cautious claim that comparatively speaking they lean towards, respectively, 'egalitarian' (Denmark), 'individualist' (the UK) and 'hierarchical' (Germany) political cultures. However, in my opinion these cultural theoretical concepts are more applicable at the organisational (meso) level rather than at the societal (macro) level and are not expected to fully account for the variation observed. Therefore, the national contexts can be used to explore aspects of the effects of the procedures, but not to explain in any strict sense how they developed their specific shapings.

In line with the theoretical explorations in Chapter III the interpretive strategy will be to apply a systems theoretical mode of observation to explore the 'challenges' experienced by the procedures and a cultural theoretical 'extension' to explore the differences in the organisational responses to these challenges expressed in the procedural designs.

Construction of Representativeness

The attempts to facilitate a larger involvement of 'the public' in technological policy making considered in this thesis can be interpreted as means to remedy perceived shortcomings in the workings of the institutional mechanisms of representative democracy, notably the apparently declining ability to ensure the broad acceptance of technological dynamics

[357] Similar difficulties are encountered and discussed by the comparisons of van Eijndhoven and van Est (2002), Bütschi and Nentwich (2002) and Hennen (2002).

through 'inclusion'. This, however, does not mean that such procedures are not confronted with questions about their representativeness, especially as they are often accompanied by a rhetoric of 'enhanced' democracy. This was particularly pronounced in the British case, where I discussed it in Luhmannian terms as a problem of regulating the inclusion and exclusion from the procedure of different kinds of actors. However, I propose that this is an issue all such procedures must find solutions to and can be defined as the need to construct a representativeness that can legitimise the procedures internally as well as externally (see also van Eijndhoven and van Est 2002). This was resolved differently across my cases, as I shall now seek to explicate.[358]

In the Danish consensus conference the core element, the lay panel, is a small and by nature highly *exclusive group*. Only those few selected by the DBT may participate. Obviously a panel of fifteen people cannot be representative of the larger population in a statistical sense. Yet the driving ideal behind such conferences is that the lay panel are more authentic representatives of 'the public' or 'ordinary people' than can be achieve through interest group representation in other types of consultations. This authenticity – based on a sort of 'value representativity' (the spectrum of values present in the wider population should be covered) – is allegedly achieved through the fact that the lay panel have no 'interests' in the topic to be evaluated.

The panel consists of citizens, who have volunteered individually, and to the extent they may be said to have a mandate this is only because the DBT has vested them with it. Nonetheless, it seems that in Denmark the political system has by and large accepted consensus conferences as a valuable and reliable complement to other channels through which the political system can observe its environment (e.g. surveys, mass mediated debates, consultations with stakeholders etc.).[359] Although the organisational format of the consensus conference is inspired by participatory ideals of an active citizenry (Andersen and Jæger 1999: 333), from the point of view of the political system they serve only an advisory function and their outputs do not pre-empt political decision making.

Sociologically consensus conferences share certain traits with the focus group methodology, the main difference being that the lay panel is provided with information before they are requested to deliberate, and that this deliberation entails dialogical interaction with 'expertise'. Nonetheless, it appears that the conferences have been *dignified* as a political methodology which is well suited to articulate concerns of 'the public', in a way that is inconceivable for ordinary focus groups.

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[358] In regard to the Danish case I shall focus primarily on the consensus conference explored because this procedure designates a bigger role for lay involvement and is arguably the procedural format of most interest to the topic at hand.

[359] Which is certainly not the case in other national contexts where the consensus conference format has been sought 'imported' (van Eijndhoven and van Est 2002: 223-24).

In the second Danish process discussed, the BioTIK initiative, 'the public' was not initially activated. I would suggest instead that the process can be interpreted as an attempt to dignify the *concerns* of the public, which many experts considered cognitively unfounded, by providing them with an 'ethical' framing prior to the launch of a public debate.[360] The subsequent initiative to stimulate public debate aimed at reaching out as broadly as possible, i.e. the 'invitation' from the political system to participate was *non-exclusive*. However, as no feed-back mechanisms were established to facilitate 'direct' uptake in the policy arena, the representativity of the communicative contributions in the public sphere did not arise as an issue.[361]

For both the Danish initiatives it can be noted that the level of communicated antagonism was relatively low. Of course there were differing evaluation of biotechnology by the expert panel of the consensus conference, but the procedural function of the lay panel was exactly to act as a mediator following 'common sense', and not taking sides in the ongoing controversy. Likewise, the public debate facilitated by the BioTIK initiative aimed to raise 'issues' in a manner that was relatively independent of social positions and interests. The aim was a resonating public sphere where themes could be debated in way, which were not tied to the interests of specific social actors.

Representativeness need not only be concerned with the social composition of the procedures. It can arguably also pertain to the thematic content of the communication, i.e. that the themes processed mirror the 'actual' concerns of the public and not the organisers. Therefore, it is worth comparing how the agendas of topics to be processed in the procedures are set. In the Danish consensus conference the overall theme was selected by the organisers at the DBT, although the lay panel was allegedly given the freedom to address any issue it felt were important. Therefore the outputs could subsequently be communicated as the 'undistorted' concerns and recommendations of 'the public'.

In contrast to the Danish consensus conference, the British GM Nation? event was emphatically *non-exclusionary*. The aim of the organisers was to facilitate and support a wide public debate where 'everybody' was given the opportunity to express their viewpoints and debate with other interested citizens – as individual citizens.[362] The primary aim was to create channels of communication for those who felt they had not been heard, and not in the

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[360] The relevance of an ethical approach was established via both 'intrinsic' arguments (biotechnology *per se* requires ethical standards) and 'extrinsic' arguments (public confidence will arise only if biotechnology is checked against ethical standards).

[361] This could be interpreted either (positively) as the assumption of an existence of a vibrant civil society, which would by itself ensure the desired resonance in the political systems for issues of public concern, or (negatively) as a strategy to diffuse public concerns by a feigned willingness to listen but without any institutional means to take notice of the articulated concerns. The compiled material does not allow me to assess if one interpretation is more adequate that the other.

[362] It was, as I have shown, an explicit aim that organised interests be bypassed.

first instance to ensure demographic diversity. As described, this meant that the procedure was exposed to suspicions of self-selection bias, which – especially in the eyes of pro-GM organisations – practically invalidated the exercise as an articulation of 'the public's' concerns.[363] The fact that a large number of people were willing to turn up at public meetings and express (at times very strong) opinions was seen to invalidate rather than strengthen the exercise in the eyes of some observers. The organisers were aware that self-selection issues could cause problems for the credibility of the exercise. As described, they therefore organised a series of reconvened focus groups to act as a control group. In effect, the procedure, which was envisioned to be non-exclusionary, depended on *exclusionary mechanisms* in order to establish its credibility as representative of 'the public' – in a much more controlled manner than in the Danish case.

In their report the steering board of the debate was keen to stress that there were in fact identical or at least parallel trends between the concerns expressed in the exclusionary and non-exclusionary debate forums. However, as some critics of the procedure were quick to point out, although the focus groups were not self-selected, they were no more 'democratic' or accountable than existing channels of policy advice, nor were they necessarily any wiser or more responsible. Again in contrast to the Danish case, neither the open meetings nor the focus groups were perceived as democratically *dignified* or vested with a mandate. As communicative forums they were significantly more contested and the level of antagonism in the organisation of the procedure and interpretation of the outcomes was markedly higher than in the Danish case.

Another ambition of the British procedure was to address the concerns of 'the public' from their own perspective and not – as had hitherto been the norm – through their translation into scientific, economic or regulatory questions. However, as it was not considered feasible to undertake agenda-setting during the large-scale public meetings, here again focus groups were organised in order to identify concerns and framings recognised by the participants.

In the separate scientific review-strand of the exercise, 'representative' mechanisms were also activated to support the credibility of science in the eyes of the public. An apparently widespread assumption that scientists did not fully understand the causalities of GM agriculture was countered through social rather than cognitive mechanisms, by selecting a panel to perform a review on the basis of both attitudes to GM commercialisation and the organisational affiliations of the experts.[364] Here, however, the aim was not a statistical rep-

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[363] Arguably, then, the public meetings were not very different from the mass mediated public debate; only people with strong opinions shift from an audience to a speaker role – just as people with preconceived strong opinions turned up at the meetings. Of course more speakers were allowed or enabled to speak (albeit to a much smaller audience) than in the mass mediated public sphere.

[364] This of course was grounded in the assumption that at least part of the public distrust in expertise had to do with the suspicion that some experts were not independent of economic interests rather than an assess-

resentation of the distribution of evaluations present in the 'scientific public'. Rather, the aim was to span the full variety of viewpoints on GMOs that had been expressed in scientific form. The intention, it seems, was as much to strengthen the acceptability of the outcome as it was to strengthen the cognitive quality of the review.[365] This approach can be claimed to conform to diagnoses of 'post normal science' and 'socially robust knowledge production' in which the validity (or rather acceptance) of knowledge claims depend as much on the social circumstances of its production as on their cognitive content (see Chapter II).[366]

The German DGG procedure was organised as a stakeholder-based technology assessment exercise. Therefore, the mechanisms of inclusion and exclusion were ordered differently from procedures with lay involvement and the issues concerning representativeness are different. From my investigation it seems that the issue of representativity – which usually forms an important part of the credibility of such an exercise in the eyes of public observers – was given little explicit consideration in the organisation of the procedure. As far as I have been able to establish, it was taken for granted that if or when concerns of whatever kind were present in civil society or 'the public', these would 'naturally' be articulated through organisations. Therefore, no lay involvement as such was perceived as necessary from the viewpoint of the organisers in the political system, in fact it was considered a potential liability to the procedure since ordinary people did not possess adequate knowledge.[367] Based on these assumptions organisations were considered as the most convenient access point for the political system to probe into such concerns and explore socially viable policy options. The procedure was only open to specifically invited organisations, the relevance of which was decided by the responsible ministry. In practical terms this does not seem to have caused any controversy and, to my knowledge, no organisations who wished to participate were denied access. Arguably, the procedure was indeed more 'open' than usual corporatist policy making, in terms of both participants and transparency for outsid-

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ment of their cognitive competence per se. To argue as I do here that the attitudes expressed by (some of) the scientists worked as selection criterion is not to say that scientific competences were neglected. I only wish to draw attention to the fact that scientific credentials were not in fact the sole selection criteria.

[365] I have no means to assess the scientific quality of the work of the panel, but the use of the scientific evaluation in the British procedure seems to conform quite well with Luhmann's general point that more research on risk issues is usually as likely to produce more uncertainty as more certainty – and unlikely to make political decision making any less complicated (Luhmann 1991).

[366] That it should not be seen as an instance of de-differentiation is visible in the fact that what was changed compared to other advisory committees was the social composition (e.g. regulation of membership rule at the organisational level) not the fact that communication proceeded in a scientific mode.

[367] Nor was any lay involvement (to my knowledge) advocated by the participating organisations, who sought to present themselves as representing either the true concerns of the population (GM sceptic organisations) or what was really in the public interest, namely a responsible application of GM technology (GM advocates).

ers. This, combined with its discursive mode of operation, was sufficient to make the procedure seem rather 'alternative' in the German context.

It was clearly the intention of the ministry to establish the legitimacy of the exercise by including 'everyone' with a view or a stake in the issues to be considered. However, compared to the procedures involving lay people, where questions about representativeness are concerned with the ability of either selected lay groups, or the composition of those turning up voluntarily to mirror the attitudes of the general population, the criteria for entitlement to participate in the stakeholder discourse were more varied and, it seems, the qualities, quantities and justifications of the different 'stakes' were not weighed in a uniform manner. The organisations invited ranged from business interest organisations (biotech, agriculture, food retailers) to unions and churches, to consumer and environmental organisations. In that respect I have argued that representativity was based on *sectorial* rather than demographic criteria. Here an interesting difference to the Danish consensus conference can be noted. In the Danish case the 'representativeness' of the lay panel was ensured by selecting people with *no* interests (i.e. 'neutral' citizens as arbiters), whilst in the German procedure this was achieved by bringing in the actors with *most* interest (i.e. stakeholders confronting each other directly instead of directing their demands to the political system).

In the activities of the steering committee 'representativity' was not established according to any external social criteria, but was derived from the issue to be debated, as fairness in representation was equated with a quantitative balance between advocates and sceptics of the technology. This procedural design was presumably necessary to ensure the participation of those considered important for the external legitimacy of the exercise, but it clearly contributed to the rather adversarial modes of interaction and communication, which meant that the level of antagonism was high throughout the procedure.

As the DDG event was supposed to 'discursive', i.e. based on the exchange of arguments removed from everyday politics, neither the number of members, nor economic importance or the intensity of preferences of the participating organisations were in principle accepted as legitimate criteria on which to base the selections. At the rhetorical level this meant that once included, all had to abide by argumentative rules and procedures. In practice, however, veto-powers combined with exit-threats from central actors became decisive for communication in the procedure. The arrangement of a discursive procedure did not do away with power-struggles, (at best) it simply moved them into the preparatory phases. This meant that the agenda setting was a matter of bargaining, not particularly 'discursive'. This was to some degree evident in all the procedures, but was particularly pronounced in

the German case, where the already polarised fronts were reified in the organisation of the procedure when the different sides coordinated their strategies.[368]

The comparisons made so far in this section are summarised in the following table:

	DK	UK	D
Ideal of representation and selection criteria of participants	Small, exclusive group dignified through demographic diversity (expected to ensure value diversity) deliberating in a qualified manner – 'Non-interested' citizens mediating perspectives of stakeholders	Inclusion of all those who turn up to offer an opinion and debate with fellow citizens – 'Interested' citizens articulating opinions	Representation of a spectrum of societal concerns by sectorial rather than demographic criteria – Interested stakeholders seeking mutual understanding (and compromises)
Level of antagonism in procedure	Low	Medium to high	High
Agenda setting for themes to be processed	Issues framed by the DBT and steering committee, specific agenda set by lay panel	Agenda set by steering board through consultation with 'representative' focus groups to mirror concerns of the public	Agenda negotiated between participants to accommodate special concerns
Focus of legitimacy of procedure	External – political system (and wider public)	External – wider public (and political system)	Internal (and organisational landscape)

As the confrontation of these three different modes of constructing representativeness shows, the regulation of inclusion and exclusion in the social dimension, i.e. deciding who the relevant actors and audiences are and who should be allowed to participate and how, can be solved in a number of different ways in procedures that are all advertised as participatory and/or deliberative ways of mitigating technological controversies.

From the cases considered here it can be argued that in procedures involving lay people – committed or non-committed – the legitimacy of the procedure seems to hinge upon the ability to establish a composition that is in some respect, be it numerical or thematic, mirrors the concerns of 'ordinary people'. Hence, even in cases where procedures are meant to function as (allegedly creative) alternatives or supplements to the standard operations of representative democracies, the representativity-issue cannot be ignored. Furthermore,

[368] In the Danish and British cases a significant number of issues pertaining to procedural aspects as well as substantive framings were also negotiated (bargained) in the respective steering committees prior to the 'actual', public deliberative procedures.

when lay people (ordinary citizens) are involved, legitimacy is primarily assessed by *external* observers, be they the decision-makers to whom the outputs are addressed, mass media observers and commentators, or the stakeholders that are affected by the outcomes of such procedures. The organisers of this type of public participation seem very aware of this. In the theoretical language suggested in this thesis it means that they are aware that they are observed not only by particular actors within their environment and with whom they are in a strategic relationship, but also by non-localised public opinion that can resonate either favourably or not to both the procedural form and its substantive output.

In stakeholder-based procedures it seems that legitimacy is much more of an *internal* issue. The acceptance of the participants weighs more heavily in the first instance, i.e. acceptance among the participants of the procedure is a prerequisite for the procedure to function at all. Obviously, exit threats from central actors who feel that their interests are under pressure weigh more heavily than those from individual, non-organised lay people. In the Danish consensus conference format exit threats by members of the lay panel does not seem a likely scenario. In the British procedure where there were no restrictions on participation, distrust in the procedures could be articulated (and resonate) in the meetings but exit-threats would have had little practical consequence.[369] One could also say that in the German case the active participation of stakeholders throughout the procedure – although the substantive agreements reached were meagre – itself lent some legitimacy to the process. This is not necessarily the case for the British event, where the large turnout of people was perceived as more ambiguous in terms of legitimacy. In the German case exit threats from central actors were very real and could have invalidated the whole exercise,[370] which gave 'important' actors significant leeway for non-argumentative bargaining.

It was argued in Chapters II and III that the kinds of procedures considered share intellectual underpinnings and socio-structural roots. One may therefore wonder why they were carried out in such different ways on the points suggested here. As the controversies in which they were meant to intervene were largely similar, these differences cannot be explained with reference to the technologies in question. The selections of those designing the procedures are presumably contingent to some extent. However, they also seem to adapt to the political-cultural contexts they are embedded in. For instance the Danish procedures are seen as rooted in and contributing to a specific Danish political culture, and they were received with much less reservation from both the political system and stakeholders than the British one – as would be expected from a political culture with more

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[369] ...in regard to the open meetings component. Both the steering board of the public debate, which included stake-holder representatives, and the scientific review panel experienced exit threats and actual withdrawal.

[370] As was to some extent the case in the earlier discursive procedure at the WZB.

egalitarian traits.[371] Although the British political system has arguably embarked on reforming the way science, politics and the public interact, the British organisers had a much harder time persuading the political system that the necessary public inputs could not be derived from surveys of individual opinions and market decisions, but required (at least as a supplement) an elaborate deliberative procedure. Likewise, the German stakeholder based procedure with a more sectorial approach to representativeness seemed more convenient in a corporatist political culture, where the inclusion and acceptance of major stakeholders is a central criteria for successful policy making and plebescitarian forms of politics are considered with some suspicion.[372]

Construction of Competence

I have argued that one significant challenge to participatory/deliberative procedures is to mediate between the various modes of observation present in the technological controversies in which they intervene. This was particularly evident in the German case where the incommensurabilities seemed particularly hardened, but it was also an issue in the other cases. I suggested that this problem could be theoretically reconstructed as pertaining to selections on two levels, namely controversies over the *choice* of the appropriate (dominant) codes or discursive framings to guide policy, and over the *application* of those codes or framings (which is where a cultural theoretical extension of systems theory seems desirable in order to account for patterns of variation). The procedures considered here are characterised by being (temporary) organisations, which must operate with a multiplicity of functional perspectives. In fact, it is part and parcel of their raison d'être that they are able operate in a poly-perspectivistic manner and seek to facilitate mediation.

Nonetheless, one discursive domain, science (or 'matters of fact'), is often considered of particular importance in technological controversies. Most actors see science as indispensable when regulating technologies, but disagreements about the appropriate application of the 'truth-code' seem endless. This thesis does not ascribe to the widespread assumption that technological controversies are uniquely (or mainly) rooted in 'scientific uncertainty',[373] but cognitive disagreement certainly plays a significant role in such controversies. Hence, I consider it to particularly relevant to compare how the procedures in my investigation included communication on matters of fact or, more broadly, how they sought to construct competence.

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[371] However, it should not be overlooked that the Danish procedures achieved significantly less public and political resonance, which may simply have made it less relevant for political actors and stakeholders to disagree with the outputs.

[372] This said, it should not be overlooked that different procedural formats – also pertaining to other technological as well as non-technological topics – are being explored in all three countries. Therefore not too much weight should be given to this 'explanation'. Reliable results would require more extensive investigations.

[373] See Schwarz and Thompson (1990) for a criticism of this 'mainstream' view.

The question of competence is particularly pertinent for procedures involving lay people, as they must compete for the attention of policy makers with more traditional, expert-based forms of policy advice. If lay people in such procedures only deliver 'attitudes' (which diverge from expert evaluations) they are less interesting for decision makers. This may change, however, if it can be proved that they in some way represent 'qualified' opinions or people with an elevated measure of competence, be it of a cognitive or normative nature.

An important motive in the organisation of the Danish consensus conferences is, it seems, that they articulate what the wider population *would* think of a given topic, *if* they were adequately enlightened (and were encouraged to deliberate with each other on the basis of this knowledge). This is what distinguishes them from surveys, and particularly from focus groups, where people *merely* articulate opinions. Therefore, the lay panel is confronted with a relatively broad spectrum of expertise to assist them in deliberating on the complicated topics concerned. It seems that this *enlightened* mini-public is one of the reasons consensus conferences have found wide acceptance in Denmark and have generated international attention. Although there is a clear role differentiation between experts and lay people, it can almost be argued that the consensus conference entails a deliberate blurring of the fact/value distinction other policy advice typically claims to uphold, since what is sought here is precisely such value-based policy advice, not neutral expert assessments to be passed on to decision makers.

Looking back to the perspectives of the theoretical considerations in the sociology of risk, it can be argued that the consensus conferences allow the affected parties – those that are excluded from decision making but must live with their consequences – to articulate their concerns (to the extent that it is accepted that the deliberations of a lay panel of 15 persons can represent such concerns) in ways that are allegedly more qualified and hence more dignified than would otherwise be the case.

Although the consensus conference's aim was to cognitively qualify the evaluations of the lay panel, it is noticeable that, in comparison to the other cases (which admittedly were on grander scales), the inflow of cognitive knowledge was relatively modest. It was part of the background of the conference that political uncertainties had in part arisen from cognitive uncertainties and lingering disagreements among stakeholders and regulators about what 'the facts' were. However, no expert studies were commissioned for the procedure as in the other cases. The knowledge carried by the invited experts was considered adequate for enlightening the lay panel sufficiently, perhaps because in reality no specific policy initiatives were expected to be based on the outcomes (alone). Instead, cognitive uncertainties were bridged through social mechanisms, i.e. by the appointment of a balanced number of experts that were known to be rather pro-GM or GM-sceptics, much as in the German procedure.

In the British case significant effort went into closing some of the alleged gaps in the knowledge about the effects of biotechnology in both ecological and economical terms, as a substantial elucidation and systematisation of existing knowledge and non-knowledge was commissioned. As such, the British procedure as a whole may definitely claim to involve more 'competence' than the Danish consensus conference. However, as I have shown this information was kept more or less completely separate from the public debate strand of the exercise. Compared to the Danish procedure this organisational structure was the product of very different political motives. Rhetorically, both the scientific and the economic study were claimed to feed into and qualify the public debate strand. In reality, however, they were primarily conceived to bolster the political system against the possible outcomes of the public debates. The Government was clearly concerned that the resonance created by the public debate strand – which the Government had not really wanted– would threaten to further complicate its policy intentions in the area.

As I have shown, this strategy back-fired on the British Government. This can be seen as an example that with a loosening of the couplings between the different functional domains, intersystemic contingency increases. When the willingness of 'the public' to accept decisions made by policy makers and scientists/technologists decline, this also impinges on the demands the political and scientific systems make of each other. Because the two additional studies were not conducted as 'traditional' policy inquiries, but were carried out in affiliation with the public debate, they were exposed to different demands of public credibility. This gave more leverage to the GM sceptics to foster uncertainties that otherwise might not have found their way into the public domain with the same force and authority. On the one hand, it seems, that the lay people participating in the procedure did not get any chance to evaluate the quality, reliability and relevance of the scientific review.[374] This was in the end a matter for the panellists alone. On the other hand, the fact that the inquiry was carried out under significant publicity appears to have had an impact on the conclusions drawn and on the basis on which political communication had to continue.

With regard to the 'enlightenment' of the participating lay people the information material disseminated in the British case also exhibited the tendency to reproduce social controversies in cognitive guises. The credibility of the information material was perceived to depend on the involvement of a broad spectrum of stakeholders. However, these clearly did not just disagree about the interpretation and importance of cognitive uncertainties, but more fundamentally about the nature of the issues to be explored at all (the question of selecting the appropriate framing). In the end this led to an information pack where divisive knowledge claims were stated without source, and which some of the lay participants, expecting unbiased information to be available in a government-run public debate, found rather frus-

[374] As might be expected from the arguments about an 'extended peer review' (see Chapter II).

trating. Overall, the British procedures resulted in a lot of 'competent' communication, but a less 'holistic' assessment than the organisers had set as their goal.

In the Danish case the education of the lay people was seen as the central task of the experts. In the British case expertise played the role of a 'rational' force countervailing the 'emotional' standpoints of the public, which can at best be seen as a very indirect educational function. In the German case significant resources also went into the acquisition and clarification of cognitive and factual knowledge. However, as the stakeholders were assumed to be already 'knowledgeable', here the function of the knowledge component was an attempt to explore what cognitive claims could be accepted by the various stakeholders as the basis of policy, as well as serve to clarify how and where issue-framings diverged.

The DGG event can be contrasted to the WZB procedure of in the early 1990s, which was organised as a participatory technology assessment exercise with a primary emphasis on cognitive expertise. In this procedure an attempt was made to separate cognitive and normative assessments of GM agriculture and bridge diverging *cognitive* assessments via discursive procedures. In the normative or political dimension this had not been a particularly successful approach, as the procedure broke down and the environmentalists chose to exit rather than to lend legitimacy to the output.[375]

In the DGG a different approach was opted for. It was accepted from the outset that communication in a scientific mode was unable to deliver unambiguous assessments, which all participants would be willing to agree as a shared basis for the exploration of policy tasks. The GM sceptics did not accept mainstream science, which they saw as too wedded to commercial interests and ideologically blind to long-term risks. (The different framings communicated march almost perfectly with the ideal-typical cultural biases outlined in Chapter II). Therefore, the function of the procedure was to explore – with the assistance of various types of expertise – where 'common ground' could be reached. In order to glue the procedure together socially, it was accepted that the respective 'sides' would bring in 'their own' expertise. One could say that the procedure put a greater emphasis on ensuring that all participants were given the opportunity to articulate their concerns in a scientific language, than on assuring the quality of the knowledge claims communicated.[376] The experts brought in by the respective 'sides' did not engage in shared clarifications of matters of fact in a scientific mode of communication (as in the British case), but laid out different

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[375] Although this perhaps does not as such support the diagnosis that facts and values are inherently intermingled in an *analytical* sense (there was undoubtedly political strategy involved as well), this does seem to be the practical implication on the procedural level.

[376] Especially compared to the WZB procedures where chains of argumentation were structured and policed quite strictly by the moderators.

scenarios and evaluations, the credibility of which were then the object of dialogue (or perhaps rather 'positioning') among the involved stakeholders.[377]

For the sponsor, the BMVEL, this was not problematic. This was so for two reasons. First, the ministry did not see itself as lacking the scientific knowledge required to make its policies reliable (nor was it under the same public pressure as the British government to display competence on the issue). From the point of view of the political system, this was not an attempt to get more (scientific) knowledge. It was in the end not so much concerned with the physical risks and uncertainties affiliated with agricultural biotechnology as with the political risks entailed in choosing between supporting or rejecting GM agriculture, which were only partly coupled to the question about physical risks. Hence, secondly, the task for the ministry was to explore the room for political manoeuvre, and if possible to mediate between the groups involved (in short: to run decision blockades). In this process it seems that cognitive consensus was of minor importance. Giving space to the various actors to articulate their concerns as best they could was more important.

This comparison is summarise in the following table:

	DK (consensus conference)	UK	D
Social mechanism for construction expertise	Expert/stakeholders encouraged to justify knowledge claims to ordinary people	Experts 'representing' different positions exploring knowledge and uncertainty to give consensual (compromised) policy advice (Did not feed into public debate strand of procedure)	Stakeholder-selected experts explore possible agreements and expose diverging knowledge claims
Cognitive product	How lay persons (representing 'the affected' of policy making) assess the spectrum of knowledge present among experts and policy actors	Best available 'socially robust' knowledge on controversial topic	Exposé of spectrum of knowledge claims on which stakeholder positions were based
Attempt at cognitive consensus?	Yes, holistically by lay panel	Yes, separately by expert inquiries	Only partly
Interaction between lay and expert assessments	High	Low	Medium (mediated through organisations)

[377] This could be interpreted as an example of an 'extended peer review', where experts have to justify their knowledge claims in front of a wider audience. However, it seems more adequate to me to consider it as one where expertise and scientific knowledge were applied as a political resource, i. e. the procedure was addressed at the political process rather than at knowledge production. Of course it is then a matter of definition (or 'taste') of the observer whether this merits the label 'knowledge production'.

The cases compared here can be seen as different responses to the challenge facing all attempts at the governance of advanced technological complexes believed to entail risks. Sophisticated scientific knowledge – though exclusionary and contested – is indispensable, but clearly not sufficient to ensure a broadly acceptable policy. However, the need for knowledge in the procedures – as well as the social mechanisms for certifying this knowledge – found different solutions in each of the cases.

All the three cases constitute hybrid forums where political and scientific types of arguments intermingle and are constituted as mutually dependent. On the one hand the quality and completeness of cognitive assessments given by experts are seen as dependent on 'science-external' criteria, i.e. that the involved expertise is 'representative' of a broad spectrum of viewpoints and interests related to GMOs. On the other hand, the viewpoints and interests must be supported with scientific knowledge claims (statements on matters of fact) of different kinds.

In this intermingling it can be argued that some procedures placed a greater weight on the 'scientific' component (understood as the clarification of causal/factual issues) compared to the 'political' component (understood as the search of collectively acceptable solutions in the regulation of technology).

The Danish consensus conference places more emphasis on the 'political'. In the cognitive dimension the aim of the conference was of course to educate the lay panel, but experts and stakeholders were encouraged to justify their knowledge claims to 'ordinary people'. The knowledge claims the lay people found reliable were the ones that found their way into their recommendations to the parliamentarians. As such the central cognitive product of the conferences was an assessment of how lay representatives ('the affected' in the sociology of risk terminology) evaluated the spectrum of knowledge claims present in the policy arena. One could call it a 'popular filter' of elitist expertise and counter-expertise before these are passed on to legislators.

The British case emerges as having the strongest emphasis on 'purified' or certified scientific input into policy-making alongside popular assessments. The social organisation of knowledge production was in this case fashioned to explore whether a broadly constituted expert panel could produce a shared evaluation and recommendation on questions 'asked' by the public (in contrast to the Danish consensus conference where the lay panel produced consensual evaluations on the basis of divisive expert assessments). As the scientific review was presented as state-of-the art scientific knowledge certified by an inclusive panel of experts, the cognitive product (of the scientific strand) in the British case was an attempt to establish what the British policy arena as a whole could count as knowledge claims on which to process disagreements about policy decisions.

The German procedure, finally, was the most hybridised case. In the cognitive dimension it – at least in effect if not in initial intention – served as an exploration of where cognitive agreement could be established among the various stakeholders. However, equally important was the task of exposing and explicating where diverging knowledge claims existed and how they were affiliated with normative positions. The cognitive product of the procedure was then to show the spectrum of reasonable knowledge claims on which the various positions were based.[378]

Again, I will not propose that the different solutions to the challenge of constructing competence are strictly defined by a unitary political culture. It should be recalled that these procedures are meant to mediate in controversies, and therefore must give some place to actors dominated by different cultural biases. Nonetheless, tendencies can be observed that the respective cases align themselves with the dominant cultural patterns of their national contexts. The Danish consensus conference, where ordinary people are invited to deliver holistic assessments of different types of knowledge was noticeably more egalitarian than the British procedure, where different types of knowledge are separated into distinct social contexts and lay people are not invited to evaluate the cognitive contributions of experts. Comparatively speaking, this leans towards an individualist culture, with its emphasis of substantial rationality, but with certain hierarchical elements (e.g. assumed trust in scientists). The British case distinguishes itself from the German procedure, where the adversarial use of expertise is embedded in a strong proceduralised mode of interaction (rules of argumentation must be fixed in advance and independently of the substantial content to be processed), while the British procedure was, to a larger extent, made up as it went along. As argued earlier this pattern should not be understood as a relationship of causal determination but rather as a sign that the procedures adjust to their respective contexts in order to ensure a certain responsiveness to their communications.

Links to Policy Making

The procedures explored in this thesis all exhibit some ambition to devise 'alternative' ways of governing agricultural biotechnology.[379] I have argued that theoretically they can be characterised as attempts to establish forums where 'traditional', strict, couplings between organisations with primary roots in particular functional systems are loosened with the intention of facilitating mediation between such perspectives. This is typically achieved through the physical co-presence of individuals. Furthermore, they can be seen as attempts to absorb protest potential by including representatives of, or simply members of, constituencies who are not traditionally involved in policy making, but are in one way or another

[378] Reasonable in the sense of being supported by reasons and evidence.

[379] Or at least alternative ways to produce policy advice for decision-makers.

affected by it. In order to achieve this, they are 'removed' some distance from the routine operations of the political system – as indeed they must be if they are to produce something other than just ordinary politics.[380] This, however, presents the the challenge of how their products are channelled back into policy-making and make a difference there.[381] To investigate this the Luhmannian concept of *resonance* seems a useful mode of observation, as it directs our attention to how communication moves across organisational borders without making claims about strict causalities in the transfer of discursive framings. In other words, this way of viewing things allows the researcher to devote attention to both structural or organisational features, and more contingent, immediate states of the involved systems of communication without preconceived assumptions about the dominance of one over the other in specific instances.[382] The task will then be to explore and contrast how the cases are configured with regard to the potential resonance of their communicative outputs in their respective environments.[383]

Two conditions are presumed to be required for resonance to be achieved. That channels of communication are available and that the messages communicated are perceived as relevant by the receiver. In the case of the Danish consensus conference, arguably, the problem of resonance was quite evident, the second condition seems to have posed the biggest challenge. Consensus conferences are organised by the Danish Board of Technology, which is a parliamentary institution. As such, its recommendations and assessments are in principle ensured direct access to the legislative, where the DBT has a good reputation. However, whether the outputs will receive any attention depends on the perceived relevance of both the topic, the exact framings and the timing, as there is no obligation for parliamentarians to process the outputs. In the case investigated it seems that the timing was

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[380] Stakeholder based procedures particularly need to create 'protected' spaces if participants are to engage in seeking creative solutions rather than pursuing influence in 'conventional' strategic ways (van Eijndhoven and van Est 2002: 226).

[381] The impacts of such procedures can be located at a number of societal levels and they are difficult to measure in a reliable way (cf. e.g. Hennen 2002). To make a difference (and be worth the effort for the involved) procedures therefore need to be related in some way to the institutional contexts where technologies are shaped. Arguably, technologies are shaped in the interaction of a number of elements such as scientific knowledge production, economic forces, legal regulation and political priorities. Ideally, then, the relationship of the procedures to all of these domains ought to be assessed. This, however, is not possible within the current investigation, and I shall focus on the links with policy making.

[382] Although, as mentioned in the beginning of chapter III, the thesis is based on the assumption that there is a systematic relation between the structural features of modern societies and the proliferation of risk controversies. This, however, does not lead to the assumption that a structural determination works in all aspects of such controversies. How they expand and contract is considered a contingent matter that requires specific empirical investigation.

[383] It should be noted that whereas the other dimensions considered can be considered as design criteria more or less at the disposal of the organisers (of course they require acceptance by participants and perhaps sponsors), this is not the case in the relationship between the procedures and their communicative environments, notably the arenas where policies are formulated, as this includes the institutional location of the organising bodies themselves.

particularly problematic, as there were no ongoing legislative initiatives that the results could feed into, and the conference had not produced any significant new framings of the issues, which could allow either politicians or stakeholders to (re)articulate concerns. These observations sit quite well with autopoeitic systems theoretical claims that the political system is operatively closed. It hence only takes up communications from its environment if they can contribute to the continuation of political communication. The consensus conference apparently did not produce framings of significant relevance for political communication. If anything, it was subsequently used to communicate an alleged correspondence between public attitudes and policy-guiding considerations.[384]

Problems in achieving resonance are not, however, only or primarily to do with temporal features. They may also be provoked by the substantive framings of the topics, as the effects of the BioTIK initiative indicate. Here the aim was to ensure that 'ethical' considerations were always 'co-processed' when legislation was prepared and administrative decisions were made. The need for 'ethics' was reiterated both in political communication and in the public sphere, but it has been difficult to establish that anything but ornamental functions have been served by this. It seems that the preparation of an ethical 'check-list' had next to no effect on the operative level of regulatory principles and organisations.

In contrast to the Danish case, the British procedure achieved significant resonance both in the public sphere and in the political system. The initiative for the debate came from the periphery of the political system, and the Government was not particularly keen on the suggestion. However, it seems that the Government's commitment to biotechnology and the particularly articulate opposition of a large segment of the population, proved good news material, and the debate received significant attention even before it took off. The Government therefore judged it unwise to reject the call for a debate, although it sought to apply a number of *immunising* strategies (temporally, socially and substantially), which would protect it from any strong commitment to the outcomes. This means that the political system sought to defend itself against (a certain type of) resonance by setting temporal restrictions on the procedures, by reiterating EU level commitments, and by seeking alternative argumentative resources.

One of the ways in which the organisation charged with arranging the debate nonetheless sought to ensure resonance in the political system was by 'forcing' the Government to commit itself in advance to responding to the outcome,[385] a strategy that was obviously only possible due to a high level of public attention. This response was expected to be

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[384] The investigation undertaken in Chapter V indicates that at the time there was in fact a – comparatively – high degree of congruency between the policies pursued by the political system and the concerns and preferences of 'the public' as articulated through the conference and measured by surveys.

[385] This was achieved through an exit-threat (a collective resignation), in a way that the Danish Board of Technology could never do.

communicated shortly after the end of the debate, but was delayed by about half a year. This can be taken as an indication of a certain amount of perplexity within the Government about what to do with an output exhibiting clear incongruence between the articulated wish of (mobilised parts of) 'the public' and the envisioned policies of the Government. However, perhaps it also indicates that once the temporary steering board was dissolved, the organisationally focused pressure on the Government was lifted, and only the more disembedded observations of the public sphere exerted pressure on the Government to make its position clear.[386] Hence a continuous organisational locus clearly seems to influence the amount of resonance that is achieved from such procedures.

As the GM Nation? event is relatively recent, it is still difficult to assess the more long-term effects of the procedure, and whether this procedural innovation will be used more widely in the British policy context.[387] From the point of view of the organisers the procedure was considered as quite successful, especially given its novelty, because it achieved much resonance. However, from the point of view of the political system it was perhaps less of a success, especially as the procedure did not seem to fulfil the politically important function of absorbing protest potential. The public climate in Britain was not de-polarised as a result of the procedure.[388]

Of the three cases in the study, the German one displays the most direct coupling between the discursive procedure and the political system, as the procedure was instigated by the ministry charged with (re)formulating the policy on agricultural biotechnology. It is notably different, especially from the British case, where the process was more or less forced upon the Government. This in a sense inverts the issue of resonance, as here it was the political system that sought to induce resonance in an organisational landscape locked into polarised positions that were characterised by incommensurable problem framings. Hence, while the British political system experienced the participatory procedure as an event that created rather than reduced complexity,[389] the German government deliberatively induced a com-

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[386] However, as I explained in Chapter VI, the delay may also be related to the fact that the focus of public attention was on the run up to the war in Iraq.

[387] Along with its substantive response to the debate, the Government published a note with the title 'The GM public debate – Lessons learned from the process' (DEFRA 2002b). This kind of learning would hardly be worth engaging in if the debate was expected to be a singular event. However, although significantly more resonance was achieved than in the Danish case, the British government will likely be hesitant to embark on a similar exercise on such a confrontational topic again.

[388] Of course it is difficult to assess counterfactually how public opinion (in whatever understanding) would have developed had the procedure not taken place, but it does seem that the procedure attracted more (contentious) attention to the topic.

[389] And the Danish political system apparently observed very little. However, the director of the DBT sees a further function of consensus conferences to induce a greater understanding of the 'public' in expert communities and among stakeholders (somewhat similar to the German case) (Interview, Klüver, see also Joss and Klüver 2001). Whether this happened and to what extent has not been explored in this study.

municative dynamic to remove decision blockades. The aim was not to promote the societal acceptance of biotechnology, but to prevent further erosion in public confidence in the food sector following the discovery of BSE in Germany in the course of adjusting national laws according to revised EU regulation. In doing so the Green minister in charge of the policy domain appeared to wish to test (and prepare) the grounds for a German law stressing the precautionary elements and circumventing the less restrictive elements of the revised EU directives, as her primary constituencies considered desirable.

This of course generated an intense interest from the political system in the communication in the procedure. However, the outputs seem to have been taken up by the political system in a selective manner where the arguments of one 'side' in the procedure had significantly more trenchancy in the political system than the other, its framings finding more resonance with the agenda of the political system.[390] Such uptake is of course inevitably 'selective'. The point here is that the alleged attempt to apply an alternative and creative means of conflict resolution by organising a 'discourse', was subsequently perceived by the GM advocates as hypocritical. In their experience the Government was never willing to give any concessions and did not assume the role of a mediator in the polarised organisational landscape, but 'chose sides'. The abstract consensual points reached in the procedures were subsequently interpreted selectively to fit the restrictive agenda of the political system, which for the GM promoters made their participation in the DGG procedure more or less futile.[391]

These links to policy making can be summarised in the following table:

	DK	UK	D
Institutional links to politics	Informative link with legislative	Antagonistic link with executive	Procedure initiated (and partly managed) by executive
Character of resonance in political process	Little explicit resonance, used to display correspondence between public attitudes and political initiatives	Immunising reactions. Government declares it will not let its policies be dictated by expressions of public debate, though it was forced to modify standpoints and postpone decision-making	Selective uptake of abstract formulations, specified to fit political programme of government

[390] Or, at least this was the impression conveyed by my interviewees (from both sides), of which some claimed to have found policy makers attentive to their interventions (the GM sceptics) and others that the political system was (ideologically) biased against and resistant to their (rational) arguments (the GM advocates).

[391] Interview, Kley.

The ability to achieve resonance is of critical import for procedures of the kind considered here. However, for the social scientific observer it is also one of the most difficult aspects to confront, as impacts or resonance can manifest themselves in many ways and in many contexts. As the discussion of the Danish case indicated, the effects of such procedures can be both socially and temporally diffuse, which makes their empirical assessment particularly difficult (while impacts that are difficult to detect are from unimportant).

In regard to the two previous dimensions of comparison I suggested a (cautious) cultural theoretical interpretation of some of the differences in procedural design. In short, the assumptions underlying the procedural selections showed a certain affinity with the (relatively) accentuated political cultural patterns observed in the respective national contexts.[392] As the observed variety the procedural design was partly explained with reference to such political cultures, there is a risk of co-founding when also seeking to explore the effects of the procedures with reference to political culture. Nevertheless, I believe a case can be made for considering the susceptibility of policy making bodies to the output of such procedures as conditioned by political culture, even if they are to some degree designed to fit their respective contexts.

The three cases explored here suggest that the effects depend on a host of factors which cannot possibly be controlled in a systematic fashion here. The size of the event,[393] level of antagonism, political pertinence of the topics, attention of the wider public sphere and various sub-publics, control of the agenda, the use of scientific and other expertise, to mention just some of the more obvious factors that vary and interact – and significantly so in the cases recounted – makes it difficult to paint a clear picture of the effects of the operationalisation of 'the public' on the basis of my three cases.[394] Nonetheless, I shall make some tentative observations, although it is difficult to discern any generalisable traits in the patterns of resonance of the analysed procedures.

One issue, that on immediate inspection seems paradoxical, is the fact that the British procedure, where the political system seemed the least receptive, was also the case where the procedure had the biggest transformative capacity in relation to the policy arena. In the Danish case the political system would be expected to be the most receptive, and yet it seems that the procedures had quite limited effects on the policy arena. There are, however, multiple differences that could account for this. These include the initial configuration

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[392] 'Relatively' in the sense that the cases are not seen as clear-cut examples of, respectively, 'egalitarian', 'individualist' and 'hierarchical' cultures. These labels only make sense when the cases are seen in relation to each other, as matters of degree rather than absolute scales.

[393] E.g. ranging from 14 people on the lay panel of the Danish consensus conference over 30 organisations in the German DGG procedure to some 20.000 participants in the British public meetings.

[394] Compare Bütschi and Nentwich (2002) and Hennen (2002) for discussions of the normative, epistemological and methodological difficulties affiliated with assessing impacts from such procedures.

of the policy arenas (in Denmark a latent public opposition to GM agriculture but not fierce antagonistic positions, compared in the UK to the aftermath of the BSE experience combined with a more organised resistance building up), the size of the event (14 lay persons and as many experts debating vs. approximately 20.000 participants in public meetings), and the previous experiences with such procedures (consensus conferences are considered 'business-as-usual' in Denmark whereas this kind of public debate was entirely novel for Britain). One factor, however, that I would like to consider in particular is the configuration of external advocates and observers beyond the organisers, seeking to 'profit' from the procedures. In the Danish case there were no such parties, as the GM sceptics ascribed little importance to the consensus conference which they thought rather unimportant in articulating opposition to GM agriculture due to its consensus-seeking nature. As the outcomes nonetheless articulated a rather sceptical attitude towards the technology, the GM advocates were not interested in directing too much attention to them. In the British case, on the other hand, the anti-GM community seemed sceptical at the outset, but eventually saw the procedures as a means to mobilise public attention and raise pressure on the political system. This interpretation indicates that the level of resonance has a lot to do with whether the procedure facilitates, or addresses external (pre-existing) actors for, mobilisation.

The German procedure was characterised by the fact that all the major stakeholders were tied into the process. However, the procedural ground rules stated that 'the public' (i.e. the media) should not be used to influence the procedures (the participants agreed on restricting publicity work during the procedure). Therefore, the participating organisations were more focused on establishing internal alliances and 'convincing' the political system (whose attention they already had) through arguments than on mobilising the broader public sphere. This, combined with the fact that German GM advocates in general had a harder time than the British GM sceptics in mobilising public opinion to, respectively, advocate and restrict the ambitions of the Government, meant that the German government found itself in a better position than the British government to control the effects of the procedure in subsequent policy formulations.

In neither case did this result in the settlement of the controversies, but politically they developed different foci as the British government was observed as (predominantly) supporting science and industry to the dismay of large sections of the UK population, whereas the German government (predominantly) sided with environmentalists and organic farmers, but attracted severe criticism from the GM advocates.

All in all, I suggest that these observations indicate that the effects of such procedures can never be assessed independently of the specific context in which they are embedded. It seems that independently of their procedural design and the political culture surrounding them, their effects in bringing policy making into closer contact with 'public concerns' de-

pends critically on the presence of 'external' actors to facilitate the observation of the outcomes in the relevant policy arenas.

Conclusion

The aim of this thesis has been to investigate the use of participatory and deliberative procedures in the regulation of controversial technologies. The selection of this topic is due to a sympathetic interest in this way of addressing disputed choices in the regulation of risky technology. However, this interest was mixed with some sociological reservations about the ability of such procedures to actually achieve the effects envisioned in their organisational self-descriptions, and the more abstract discourses of their sympathisers. If guided solely by the proliferation of claims by advocates of public involvement regarding the normative and pragmatic advantages of such procedures, one could be led to believe that such procedures would be widely adapted in the standard repertoires of the governance of technology. This does not seem to be the case. Nevertheless, there are indications that more inclusionary and argumentative modes of policy-making are on the rise in a number of contexts, which arguably warrants a sociological interest in understanding in more detail how such procedures actually operate.

This led to the attempt in the thesis to understand and explain 1) why such procedures have emerged and presumably are increasing in number and importance, as well as 2) how and why they take particular social forms in different contexts. This was based on the description and analysis of typical cases, i.e. cases somehow 'representative' of their respective contexts.

The exploration of these questions has been undertaken within a framework inspired by autopoietic systems theory, as this theory delivers what I consider to be one of the most penetrating analyses of the dynamics of risk controversies as rooted in the structural features of modern societies. Modern societies are here understood as functionally differentiated, and risk controversies are seen as the product of confrontations between mutually incongruent modes of observation and a declining ability of the functional systems to condition each other's operations in ways that are convincing to 'the public'. This public is seen not as a social entity, but as a particular mode of communication that is carried by a number of actors and resonates across the various functional domains that influence technological trajectories. This has led to a proliferation of communication about all sorts of risk, which can be understood as an increasing awareness in social systems that decisions made in the present may have adverse effects in the future, but this cannot be known with certainty. Such decision-making under uncertainty tends to have socially divisive effects as the potential for adverse effects are assessed differently by decision-makers and those affected by decisions but with no influence on them. As no specific functional system has evolved to deal with the problem of the uncertainty of future events, they tend to be 'pushed around' (resonate) across different systemic contexts to release social tension, including the kind of technological controversies discussed here. Within this framework the

emergence of participatory and deliberative procedures can be interpreted as an attempt to establish specially differentiated, organisational forums in which technological controversies can be formalised by creating 'argumentative spaces', where individuals and groups not traditionally involved with policy-making can be included in 'poly-perspectivistic' communication in order to formulate (recommendations for) policy-making on a more holistic basis than is possible for individuals and organisations operating primarily with a single systemic perspective.

In short, the function of such forums is to produce legitimacy, understood in the descriptive sense as the willingness of non-decision-makers (those affected) to accept the decisions of policy makers, and to make these decisions the basis of their own future operations (rather than seek to block or revoke decision-making). Allegedly, such procedures do this by allowing more perspectives and 'knowledges' to be taken into consideration, and incongruencies in interests, values and cognitive assessments to be bridged with various social mechanisms (inclusion/argumentation). As such, the procedures – if or when successful – can be seen as contributing to the integration of modern societies.

I have argued that in the scholarly debates on these issues a certain semantic on participation and deliberation has developed, which has inspired the search for solutions to legitimacy-problems regarding the social management of technology. This semantic, with various nuances, has also (to varying degrees) functioned as a self-description and self-prescription for such procedures, that is, it has inspired what I have called the 'operationalisation' of 'the public' for involvement and it has influenced the expectations at such procedures from different observers.

In spite of the common features of such procedures, both in respect to their socio-structural basis and their intellectual underpinnings, their empirical instances exhibit significant variation on a number of points. Arguably, the discussions on the intellectual underpinnings illustrate a high degree of international cross fertilisation in social scientific communication, but they are appropriated differently in different policy contexts. I have argued that while systems theory is a useful tool for theorising the background and much of the dynamic of technological controversies, it is less well equipped to explore the specificities of cross-national variation in the 'operationalisation' of the ideals of increased public involvement. Nonetheless, I have sought to consider the procedures investigated as 'functionally equivalent', and have tried to characterise how they express different choices on theoretically similar issues, which are central to the functions such procedures are designed to carry out. These were what I called, respectively, a 'risk controversy thematic', a 'trust thematic' and a 'mediation thematic'.

The risk controversy thematic has to do with how procedures seek to reconfigure the decision-maker/affected interface, which according to the systems theoretical analysis is central to risk controversies, and how they establish ways for (representatives of) concerned or

affected members of 'the public' to address decision makers and perhaps influence policy choices.

The trust thematic concerns the mechanisms devised to facilitate the acceptance by 'the public' or the affected of decisions made by policy makers and regulators, and ensure that they feel confident that their safety and wider interests are adequately looked after.

Finally, the mediation thematic looks at the ways the procedures facilitate modes of communication through which the participants can get better acquainted with each other's perspectives on the technological and regulatory issues of and possibly establish common frames of reference.

The procedures analysed all made more or less conscious selections on these dimensions (i.e. design choices were the object of decision-making in the organisations arranging the procedures), but these differed quite significantly across the cases. These differences were difficult to explore and make sense of using systems theory alone. Therefore, I opted for an 'extension' of systems theory with cultural theoretical distinctions to explore the diversity of organisational commitments and national variance. 'Cultures' were in this context understood as patterns of preferences (biases) creating asymmetries in the selectivity of organisational decision-making. The comparison indicated that the operationalisation of mitigation through some kind of public involvement was in fact aligned with what could be considered the dominant pattern of political culture in the individual cases. This should not be understood to mean that procedural froms were in some sense 'determined' by their national contexts, but it indicates that – at least in the investigated cases – the organising bodies are knowledgeable about the environment in which the operate and attempt to fashion the procedures to achieve effects. It should not be overlooked that all cases were the results of specific trajectories of controversy, which were rooted in complex patterns of interaction in the respective policy arenas intermingling several 'cultures'. This meant that the procedures did not adhere in an unambiguous manner to ideal typical political cultures.

From a systems theoretical perspective a number of difficulties for this kind of procedure can be predicted (as compared to their idealised self-descriptions and aims). However, instead of discussing such potential difficulties in an abstract mode, I opted for an approach which identified a number of concrete 'challenges' as actually observed in the cases. Arguably, these challenges to fulfilling the self-prescribed aims of the procedures were concentrated at different points in the cases investigated – presumably due to the variation in the design-criteria of the procedures. I then identified three major types of challenges to such procedures. Each was particularly pronounced in one of the cases, but represented issues all such procedures must address. These challenges I labelled 'resonance', 'inclusion' and 'mediation'.

The problem of resonance pertains to the ability of procedures to actually influence the regulation of technology through the transferral of the observations and concerns articu-

lated into other communicative contexts, as well as make a difference in these other contexts. The problem of inclusion is about deciding who should participate and who should not, as well as what themes are appropriate to be processed in such procedures. A particularly pertinent topic in this respect is that although the participatory and deliberative procedures considered here are often envisioned to function as supplements or even alternatives to the mechanisms of representative democracy and existing modes of governance, they are, it seems, inevitably faced with questions about 'representativeness' in one form or another. Finally, the problem of mediation has to do with what social mechanisms are devised to facilitate common points of reference across the different framings of biotechnology. Here scientific communication (on 'matters of fact') is often invested with specific expectations because the procedures concern technology, the material core of which is seen as different from other policy domains where 'science' plays no role.[395] Often, expectations are communicated that a scientific rationalisation of such controversies is possible (and desirable), and the use of 'expertise' in such procedures is often closely intertwined with modes of activating and involving 'the public'. This tripartition of challenges is not claimed to be an exhaustive list, participatory procedures of the kind discussed here may encounter difficulties that do not fit into either of these categories. However, I will argue that their theoretical grounding combined with the empirical relevance these categories exhibit allow me to conclude that they are both *generic* and *essential* – and must be expected to be of relevance for the observation of all such procedures. Even where these issues do not prove problematic, the characterisation of procedures pertaining to how these (potential) challenges are addressed will hold important information.[396]

Based on the assumption that these 'challenges' are particularly interesting and telling about the social dynamics of such procedures, I focused the comparison of the cases on how they provided different solutions to these challenges and how the solutions opted for could be interpreted on the background of the respective contexts and histories of the procedures.

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[395] This should be seen in relation to the diagnostic claim referred in the introduction that science as an institution has increasing difficulty in abdicating responsibility for the effects of the technological applications of new scientific knowledge.

[396] That the three types of challenges are generic and essential does not mean that they are necessarily wholly independent of each other in practise. Inclusion (especially the willingness to participate) may depend on expected resonance, just as resonance may depend on perceived legitimacy in terms of inclusion (e.g. representativeness) and ability to mediate. Likewise the potential for mediation (taking an argumentative attitude) may be a product of perceived closeness to policy making.

In order to avoid repeating the details of the individual studies and their comparison, I summarise the findings of the comparison in the following table:

	DK (Consensus Conference)	UK (GM Nation?)	D (Diskurs Grüne Gentechnik)
Principles of representativeness	Exclusive – but dignified – panel of 'ordinary people'	All-inclusive – but contested – public meetings combined with exclusive 'control-groups'	Delegated to stakeholders on 'sectorial' basis
Competence (scientific)	Procedurally embedded – expert disagreements mediated through lay people	Procedurally isolated – inclusive and consensus-seeking	Procedurally embedded – Standpoint-based and divisive
Competence (of lay persons)	Enlightenment through dialogue with experts	'Off the street' – provided with information material	(No lay involvement) Wider public seen as audience of procedure
Links to policy making	Independently run procedure, with permanent institutional link to Parliament. No commitment from legislative to process outcomes	Independent procedure run by temporary organisation. Government 'forced' to respond to outcomes	Procedure initiated by executive (but procedural control by participants)
Response of political system	None! (immediate) Claims that policy is relatively well adjusted to articulated concerns	Rejection! 'Hypocrisy' – must respond but does not fundamentally alter policy commitment	Selectivity! Adherence to one 'side' of articulated concerns
Effects?	Relatively high correspondence between public concerns and pursued policies (within EU framework) (Possibly the result of longstanding public debate rather than investigated procedures)	Continued dissonance between public concerns and pursued policies	Correspondence between public concerns and pursued policies, but open conflict with organised interests and internal tensions in political system

Now what can be learned from all this? In my research question I set out to explore "how the conceptions of 'the public', their concerns and their role in policy-making (in participatory and deliberative procedures) mediate the effects of public controversy on policy formation in this area."

First of all, the roots of controversies over biotechnology are found in structural features of modern societies, which are arguably more or less identical across most of Europe, and a number of ideas (or semantics) about the advantages of mitigating controversies through inclusion and argumentation are arguably common to (or at least were commonly available to) the procedures. Despite the fact that the initial assumptions – that varying 'assumptions are made and discursive framings propagated concerning (the nature of) 'the public', the issues actually at stake in the controversies, the distribution of competences among different actors in the policy arenas and what the relevant (and legitimate) inputs into policy

making from the public' are (see Introduction) – proved to be correct, it is no straight forward task to draw unambiguous conclusions from the investigation.

On the one hand I believe I have identified and discussed a number of issues of relevance to the understanding of such procedures as a particular type of communication when analysed against the background their structural location and organisational embedding and their effects on policy arenas. I contend that the systems theoretical observation of such procedures as product of problems emerging when various uncertainties resonate across systemic borders under public scrutiny has provided some fruitful tools for observing the communicative structure and dynamic of such processes. The empirical cases have provided a series of observations about what actually happens when participatory and deliberative ideals are taken up by different actors, embodied in specific institutional settings and operationalised in actual procedures, with varying claims on including 'the public' (whether as lay citizens or as stakeholders) closer into policy formulation.

On the other hand, it strikes me as difficult to derive any strong generalisable conclusions from the study with regard to the effects of such operationalisations. It is difficult to read any general pattern from the cases investigated in the sense of some operationalisations being clearly more efficient than others in terms of mitigating controversies, (re)establishing public trust in technologists or decision makers, influencing regulatory decision making or 'democratising' the factors influencing technological trajectories, as the advocates of such procedures at times claim that such procedures can or ought to do.

The limited capacity for generalisation emerging from the case studies can of course be ascribed to the design of the study. Three cases considered in relation to a number of variables does not invite clear-cut generalising assertions. However, I suspect that it also has to do with the substantive nature of the cases. Arguably, technological controversies carried out in public are exposed to a number of contingent influences, which makes it difficult to make more general inferences with regard to their internal dynamics and external effects. The question of whether they can in fact fulfil their envisioned functions – whether these are to provide better knowledge, absorb protest potential or 'democratise' technological decision-making – depends not only on the procedural design and the institutional and political cultural context, but also on factors that appear to be more difficult to summarise in neat 'variables'. In short, there is a lot of contingency in play here.

In a strict interpretation this means that the research question cannot be provided with a simple and exhaustive answer. What can be said is that I have mapped how the 'operationalisations' of 'the public' has impinged on the policy arenas in the three cases investigated, and have empirically identified a number of 'challenges', which can cause difficulties for such procedures in reaching some of the goals expected of them by their advocates. This does not mean that such challenges will impinge on the workings of all such procedures, but I contend that they are issues that all such procedures must address in one way or another, even if only implicitly.

In spite of these reservations about the generalisability of the findings, I will propose a few more general conclusions, which I believe can be drawn from the combination of theoretical reflections and empirical investigations undertaken, and briefly take stock of the contribution of this work to the sociological understanding of the participatory/deliberative mitigation of technological controversies.

One feature, which strikes me as particular noticeable, is the fact that none of the procedures actually managed to settle the controversies, nor significantly alter the divisive standpoints of the various stakeholders and members of the public in the respective public spheres. I argued initially that under 'controversy' one can abstractly understand the communication of dissent (see Chapter I). Drawing on the discussions in Chapter III this understanding can now be specified into the claim that technological controversies – at least from the systems theoretical perspective – can be defined as dissensual communication about the criteria determining when a technology is 'working' (i.e. can reduce causal complexity) and when it is not working (i.e. surprises are expected or observed). This means that technological controversies principally can be ended in two ways. Either (sufficient consensus is reached on such criteria. This means that all actors make agreed principles of governance the basis of their own operations rather than contesting them. This is the ideal solution according to the participatory/deliberative semantic. Alternatively – which is probably the more common outcome in reality – the controversies understood as the ongoing communication of dissent may simply ebb out because the actors run out of energy or new themes arrive on the horizon of public attention. Neither seems so far to be the case regarding GMOs in the three countries included in this study. There were arguably displacements in the themes being processed, the framings used and the constellations of actors (e.g. the German stakeholders interacting more intensely with each other on each 'side' of the controversy). However, nowhere were the controversies abandoned or neutralised in consensus. In the cases where 'ordinary people' were activated to assess technological and regulatory options on the basis of their 'common sense', their evaluations cannot be said to have had particularly significant or observable effects in following political communication (in Denmark relatively little resonance was achieved by the procedures, in the UK the Government carried out immunising measures to maintain its envisioned policies, despite the rather sceptical attitudes articulated in a consultation it had itself (reluctantly) approved and sponsored).

For the advocates of participatory and deliberative procedures these findings must appear disappointing.[397] Compared to the normative principles discussed in Chapter II, a number

[397] This statement obviously calls for the qualification that it cannot be known counterfactually what would have happened if the procedures had not taken place. In a banal sense this is of course always true, but in

of shortcomings in the design and execution of the procedures can be made out, and the observations made in this thesis do not justify an argument that 'such procedures will never work', that the search for the right operationalisations might as well be called off. In fact, much indicates that modern societies cannot give up the search for ways to 'democratically' handle such controversies.[398] But the study does perhaps indicate that expectations in the mitigating capacities of participation/deliberation may need to be tempered, and controversies be tolerated as an integral part of the social management of technology – even if this does not adhere to normatively based theories of social rationality.[399] From the viewpoint of autopoietic systems theory the fact that controversies are not 'settled' simply means that communication continues. Therefore, technological controversies carried out in the public sphere, in sub-publics and in markets in less proceduralised manners can arguably be observed as constantly ongoing social assessments of technologies, albeit in more antagonistic manners that the more formalised procedures discussed here (Wynne 2002).

The fact that relatively modest impacts were discernable in regard to policy making should however not obscure the fact that such procedures may have other, more long term effects, which may be quite significant. The Danish case seems rather paradoxical in the sense that although it was difficult to trace any immediate effects from the procedures, there seemed – comparatively – to be a better correspondence between the concerns articulated by 'the public' and the subsequent policies pursued than in the British case, where the procedure drew a lot more attention. One explanation offered for this (but not 'proved') was that this type of public involvement in (formalised) debates about technologies has a much longer history in Denmark that it does in Britain, where the political system has only just embarked on a self-proclaimed process of sensitising itself to input from 'the public' in regard to science and technology. In this perspective, the GM Nation? procedure may have constituted a significant piece of institutional learning, although any lasting effects remain to be seen. Likewise, the German case, although it did not directly involve lay people in discussions, can also be interpreted as an expression of a mode of policy making in transition to-

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terms of research methodology and design this problem can be countered by seeking comparable cases where the presence and absence of specially differentiated participatory procedures as a policy tool is included as a variable. This, however, would have been a different thesis.

[398] 'Democratic' is arguably a concept that constantly evolves, as the still stronger resonance of participatory and deliberative ideals in itself indicates.

[399] This assessment can be seen as an empirical counterpart to the normative critique by Chantal Mouffe of deliberative ideals that democratic politics inevitably entails an element of conflict, which no argumentative procedures can do away with completely without excluding in advance either certain participants or certain thematics from political strife (Mouffe 2000).

wards more open and democratic forms.[400] Hence, it seems that future research could benefit from a more extended temporal perspective than that used here.[401]

This means that such procedures in fact hold the potential to mediate the concerns of 'the public' in regard to the governance of technologies, in the sense that they may slowly reconfigure policy arenas – what in systems theoretical terms could be labelled a 'structural drift' (Luhmann 1997: 862). Although they do not in the short term provide the kind legitimacy gains or corridors of popular empowerment that some observers hope for, they may in other respects facilitate the uptake of a broader spectrum of interests, values and concerns in the social management of technologies. However, they do so in 'competition' with a number of other social forces and I consider it unlikely that they will eventually do away with technological controversies in the sense of creating unitary assessments of when technologies 'work' in acceptable ways.

One final feature of the cases studied worth noticing, is the obvious 'mismatch' between the location of the procedures of public involvement and the location of central elements of policy formation. In regard to agricultural biotechnology most of the major regulatory principles and procedures are drawn up at the EU level, but practically all procedures aimed at a more substantial involvement of 'the public' are located in national or sub-national contexts. Of course the governments of the member states are significant actors in shaping EU regulation (and as such the concerns of the populations of the member states do not necessarily go unnoticed). However, given the lingering theme of the 'democratic deficit' associated with the EU institutions it is likely that participatory and deliberative semantics will increasingly be directed at the EU institutions. Attention to the problematics of public involvement are beginning to emerge in discussions at the EU level – see for example the white paper on the 'Governance of Expertise' (Liberatore 2001) where increased public involvement and processes of civic dialogue are explicitly encouraged. This indicates that such modes of acquiring policy advice and producing legitimacy is already and presumably will increasingly find its way into supra-national institutions such as those of the EU. This raises not only institutional challenges, but also challenges for social scientific observers about how such procedures should be conceptualised and analysed. These will inevitably add difficulties to the challenges encountered in this thesis.

One problem facing research in this domain is, in my experience, the often large divide between the sociological-theoretical reconstruction of technological controversies and participatory/deliberative procedures on the one hand, and the empirical analyses and assessments of specific procedures on the other. I hope, however, to have shown that worth-

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[400] However, an alternative interpretation could be that this was a clever strategic move by the Green minister to create leeway for her envisioned policies by committing stakeholders to the articulation of some principles, which could then later be interpreted selectively to the advantage of the restrictive course of the ministry.

[401] This would of course entail a number of methodological challenges that I cannot enter into here.

while knowledge can be acquired in a reasonably reliable manner by means of a deliberate attempt at combining relatively sophisticated social theorising with detailed, comparative empirical inquiries. Hopefully this thesis has thus contributed to the general sociological understanding of technological controversies and how they are and can be addressed by modern societies. As such, it is my hope that the approach taken in this thesis can provide a stepping-stone and inspiration for similar research in other contexts, be they sub-national, national or supra-national.

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Interviews Conducted

Denmark

Mette Gjerskov, Civil servant at the BioTIK secretariat, Interviewed 16.01.2004.

Søren Gram, Project Manager, Danish Board of Technology, Interviewed 21.01.2004.

Lars Klüver, Director, Danish Board of Technology, Interviewed 13.01.2004.

Bo Nomander, NOAH activist, member of expert panel in the 1999 Consensus Conference, Interviewed. 20.01.2004.

Peter Sandøe, Professor of Bioethics at the Royal Agricultural and Veterinarian University, member of the BioTIK expert commission, Interviewed 14.01.2004.

Jesper Toft, former NOAH activist, consultant for the BioTIK initiative and member of steering group for the 1999 Consensus conference, Interviewed 19.01.2004

United Kingdom

Richard Able, secretary for the steering board of the 'GM Nation?' debate, Interviewed 5.10.2003.

Clare Devereaux, Five Year Freeze, member of the steering board of the 'GM Nation?' debate, Interviewed 15.07.2003

Robin Grove-White, Professor of Environment and Society, University of Lancaster, Member of the AEBC and the steering board of the 'GM Nation?' debate, Interviewed 14.07.2003.

Gary Kass, Parliamentary Office of Science and Technology, member of the steering board of the 'GM Nation?' debate, Interviewed 15.07.2003.

Andy Stirling, Senior Research Fellow, SPRU, University of Sussex, member of the scientific review panel, Interviewed 20.08.2003.

Germany

Berhard Gill, 'Privatdozent' in sociology, University of Munich, expert witness in Diskurs Grüne Gentechnik, Interviewed 4.05.2004

Ruth Hammerbacher, Moderator of Diskurs Grüne Gentechnik, Interviewed 25.04.2004.

Gispert Kley, Bund Deutsche Pflanzenzüchter, member of steering committee of the Diskurs Grüne Gentechnik, Interviewed 26.04.2004.

Manfried Lückemeyer, 'Unterabteilungsleiter', BMVEL, Interviewed 27.04.2004.

Helmut Röscheisen, Deutsche Naturschutzring, member of steering committee of the Diskurs Grüne Gentechnik, Interviewed 27.04.2004.

Heike Velke, Deutsche Forschungsgemeinschaft, observering member of steering committee of the Diskurs Grüne Gentechnik, Interviewed 27.04.2004.

Regine Wollersheim, 'Abteilungsleiterin', BMVEL, chair of steering committee of the Diskurs Grüne Gentechnik, Interviewed 28.04.2004